RAILROAD GAZETTE

FRIDAY, JUNE 20.

CONTENTS.

ILLUSTRATIONS: PAGE.

Ohio Connecting Railway—Sketch Map of Section (With Inset) 430
Axles for Heavy Tenders—Master Mechanics' Association 431
110-Ton and 40-Ton Traveling Cranes in Position 432
Proposed Journal Box, Bearing and Wedge for 60,000-lb. Cars 435
The Fox Automatic Coupler .. 437
Flexible Side-Bearings 438
Sand-Papering Machine 438

CONTRIBUTIONS:

Permissive Blocking with Automatic Signals 429
Track-Circuit Block Signals ... 429
The Next Step in Railroad Extension 429
Starting Valves for Compound Locomotives 429

EDITORIALS:

The Master Car-Builders' Convention 442
From Denver to Salt Lake 442
How to get Good Service from Trainmen 443

EDITORIALS: PAGE.

The Board of Trade and the Railway and Canal Commission 443

EDITORIAL NOTES 442, 444

NEW PUBLICATIONS 444

GENERAL NEWS:

Technical 441
The Scrap Heap 441
Locomotive Building 444
Car Building 444
Bridge Building 444
Meetings and Announcements 444
Personal 445
Elections and Appointments .. 445
Railroad Construction 446
General Railroad News 448
Traffic 448

MISCELLANEOUS:

The Master Car-Builders' Convention 434
A Standard Method of Testing Locomotive Engines 436
The Boyden Brake 438
Block Signaling in America ... 438
The Master Mechanics' Association 439
Richmond Locomotive Works. 440

Contributions.

Permissive Blocking with Automatic Signals.

The Hall Signal Co.,
NEW YORK, June 14, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your fourth article on American Practice in Block Signaling, in the *Railroad Gazette* of June 6, we beg to call your attention to a statement contained therein regarding our new permissive blocking arrangement, which does not do us full justice, as it fails to describe our later improvements in this line. Our system, as now being applied on the Boston & Albany and New York Central & Hudson River railroads, *fully provides* for the protection of any and all trains entering the block permissively, without regard to their comparative distances from each other, or to the fact that one train may pass out of the section while the second or third trains may still occupy the same. In other words, *the last train* (of two or more) entering the section will be the first to clear the signal.

While we are not advocates of permissive blocking for regular practice, we have found it necessary to meet the views of several railroad managers in this respect and the new Hall permissive block system is the result of the inventive genius of our Mr. A. W. Hall in the solution of this problem. That this new improvement marks a decided advance in the art there can be no question, as it gives our wire system every advantage of the rail circuit in this respect, with none of its practical disadvantages, and *completely removes* the objection often made to the use of a wire system for permissive blocking.

WILLIAM P. HALL, President.

Track-Circuit Block Signals.

The Union Switch & Signal Co.,
SWISSVILLE, Pa., June 10, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We most respectfully call your attention to certain errors which are contained in your fourth article on "American Practice in Block Signaling," issue of June 6, 1890.

We wish more particularly to state that the failure of the system of electro-pneumatic signals on the West Shore road was not caused by faults in their design or in the details of construction. Our signals remain very nearly the same at the present time as they were then constructed, and their present success is owing entirely to the interest taken in them and the intention that they shall succeed by the railroad officers themselves. Their failure on the West Shore should be ascribed to neglect, which may have been caused by a want of money, but which existed nevertheless. As erected, the main air pipe was located about a foot below the surface of the ground. The embankment subsequently sunk in places many feet, in consequence of which the pipe broke, and our inspector found on making an examination that the air was being pumped into the ground instead of into the pipes. This is only a sample of the difficulties experienced by us on that road.

With reference to the statement made in the following words: "The adjustment of battery power at just the right quantity and intensity, and the adjustment of the armatures of the electro-magnet and other parts of the apparatus of track circuit signals have to be attended to with care, and the records of such signals in actual use show that lapses will sometimes occur in this respect. The worst consequence of such irregularities is generally a delay to trains, but they will sometimes cause a signal to stand at safety in spite of the entrance of a train to the section." The only case of a signal remaining at safety while a train was on the section occurred about ten days ago. The cause was hardly to be anticipated, and was as follows: During one of the late heavy storms a track relay controlling the circuit between the home and distant signal was struck by lightning, and the extension of the armature was fused to the platinum contact point so as to form a rigid contact. We have heard of houses being struck by lightning and burned down, but we have never heard the houses blamed for it.

Any failure in the electric current will only result in setting all the signals concerned to danger, and this is true in the very nature of things, for the signals are at safety only when the circuit is closed, and any interruption in the circuit is sufficient to put them to danger.

THE UNION SWITCH & SIGNAL CO.
By E. H. GOODMAN, Gen'l Manager.

[In our discussion concerning the possibility of signals showing safety when danger exists, we referred to track circuit signals in general, and not to the pneumatic system specifically. In speaking of the pneumatic semaphore, we said that the blade was moved both ways by air pressure. We should have said that it is moved from danger to safety in this way and from safety to danger by the counterweight, the absence of force thus throwing the signal to danger. As explained at the outset, the articles on signaling did not go into technical details, references being given in each case to previous descriptions in the *Railroad Gazette* for information on that branch of the subject. The illustrated descriptions referred to in the article of June 6 correctly stated the point which the above-cited careless language left obscure.—EDITOR RAILROAD GAZETTE.]

The Next Step in Railroad Extension.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is interesting to notice the progress of railroad building westward. There are natural centres which it is necessary for all roads to touch, either with their own line or by connecting lines. Chicago and St. Louis were the first points in the march across the continent, from east to west, that it was necessary for the trunk lines to reach. These were the terminal points of the strongest lines in the world. Omaha and Kansas City were the next points of importance which it was necessary for all the strong roads to enter. The next jump was to Denver and Pueblo. Most of the roads of what might be called the second group have built, or are about to build, a line to reach from the Missouri River points mentioned to Denver. Here a break is noticeable, and a new system of roads is found, the Great Union Pacific being the only one as yet to venture past this boundary. What is to be the next step westward from this point is an interesting problem. The Rio Grande lines cannot accommodate all the roads that have their western termini in Colorado and keep the peace. The Union Pacific has its own through line and particular connection to the East from Omaha. What is the next move?

Salt Lake City will, without doubt, be the next western terminal for a particular railroad district, and is, therefore, of more than ordinary interest, from a railroad standpoint. That Salt Lake is rapidly growing into a great city is not questioned. The city is the centre of a particularly rich country, which contains immense wealth in minerals and large agricultural interests. It is also the centre of a stock-raising country. So far as machinery and productions are concerned, Utah is, strictly speaking, a consuming country, and it is not necessary to haul empty cars in any direction. The territory does not as yet produce sufficient crops for home consumption, and a good market is found here for Kansas and Nebraska grain and hay.

The roads in Utah have a heavy local business; in fact, they do not accommodate half the possible trade. This year will see a number of new branches and extensions completed. The Utah Central has just opened a new line through the Wasatch Mountains from Salt Lake to Park City. The Union Pacific is continuing its southern branch from Milford southeasterly to the Pacific Coast, opening up one of the richest mineral and agricultural sections in the West. This new extension means two things: a new prosperity for southeastern Nevada, and a through line of its own for the Union Pacific, from Council Bluffs to the Pacific Ocean [It has one already.—EDITOR.] The Southern Pacific will, some of these days, find itself without the Union Pacific's Western business. But to return to the question of Western outlets for the roads centering in Denver and Pueblo. The Denver & Rio Grande in connection with the Colorado Midland and Rio Grande Western is announcing through trains between Salt Lake City and Chicago about July 1 in connection with the Rock Island. The Rio Grande system has about completed the widening of its gauge. If this new line is to be worked under an agreement similar to the Union Pacific and Northwestern, will this not add an additional complication to the demoralized condition of rates, that can only be straightened out by such roads as the Burlington and the Milwaukee having western outlets of their own?

There is a spectre looming up in the shape of a new direct line from O'Neill, Neb., to Salt Lake City, a distance of 860 miles. This new road, the Pacific Short Line, is laying track at the rate of two miles per day, runs through a remarkably good country, and will, when completed, have a line probably 150 miles shorter than the Union Pacific and Northwestern between Chicago and Salt Lake City. The roads that push into a new country and build branch lines to accommodate the people in local traffic are the ones that prosper. Take the Denver & Rio Grande system; its great prosperity is largely due to this policy. This line and its western outlet have made hosts of friends by their liberal policy in building branch lines to mining camps and new towns. Prosperity and progress have stepped over the western boundary of Colorado into Utah, and it is to be hoped that the strong roads will keep pace with it. Compare Utah to Colorado five or six years ago, and add an immense area of land capable of raising rich crops, and the conditions are clear. D. E.

Starting Valves for Compound Locomotives.

HANOVER, May 31, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

What you say about the conditions for the working of starting appliances for compound locomotives on page 331 of your paper [May 16] is quite right. But the knowledge of the working of the intercepting valve is not limited here, large experience having made its performance perfectly clear.

In Germany the starting of a close-coupled passenger train is much harder than in America, because the drawbars are continuous under the carriages and the space between the buffers is taken up by the screw couplings. Such a train forms, therefore, nearly one piece, every part of which must be started the same instant. Loose-coupled goods trains on a level road are easier to start. If the goods train stands on an incline with all couplings in draft, it is the same as with a close-coupled train. In England and America the close-coupled trains, even if on an incline, are easier to start, because the drawbars are not continuous, but have a spring behind each buffer, which gives more or less way when starting, so that one vehicle is started an instant before the next one, and the great resistance at the start need not be overcome by the engine at once, but within more or less space.

In all cases the starting appliance should not only give the full tractive force available by the adhesion of the drivers for the first instant of starting, but also keep this maximum force as long as possible, at least for the first half revolution, after which the whole train is in motion. This condition is fully kept by Mr. Worsdell's and my valve, as shown on page 815, *Railroad Gazette*, Dec. 14, 1888. The valve, after having been closed by the pressure of the live steam on the small pistons, is kept in this position by the pressure of this same wire-drawn steam on its back side, which reaches usually 40 to 50 per cent. of the entrance pressure. It cannot open until the pressure in the receiver has reached nearly the same amount. Now, the receiver, if twice as large as the high-pressure cylinder, is filled by the first exhaust with $\frac{0.75}{3} = \frac{1}{4}$, by the second with $2\,\frac{0.75}{3} = \frac{1}{2}$ of the entrance pressure, causing the starting valve to open with the second exhaust, or, when there is condensation, even later, but always after one-half to one revolution and independently of the proportion of the exhaust pressure in the receiver to the entrance pressure of the live steam.

The intercepting valve of the Michigan Central engine, on the contrary, will always open as soon as the exhaust pressure in the receiver, working on its front side, has reached an amount equal to the pressure of the live steam on that annular area. This area must be kept smaller than one-fourth of the front area, to prevent the valve from moving when the engine is running at easy grades, with a receiver pressure changing between 25 and 35 per cent. of entrance pressure. For these reasons that valve must open with the first exhaust, because it has no back area exposed to the pressure in the low-pressure valve chest.

I hope your readers will see from this that there exists perfect knowledge here of the performance of the intercepting valve.

Other starting appliances without an intercepting valve, like Lindner's, described on page 743 of this paper, issue of Nov. 15, 1889, can only give the full tractive force on starting, when one of the pistons is at work, and this only for one-eighth to one-sixth of a revolution. If the high-pressure piston is beginning the start, no live steam can be given in the receiver to keep the piston free from back pressure, but then the first exhaust in the receiver gives only one-quarter or less of entrance pressure, which is insufficient to drive the low-pressure piston and continue motion. If the low-pressure piston is first at work, the receiver must be filled up to one-half the entrance pressure to get full force; this pressure reduces the force of the high-pressure piston, when it comes to work after one-eighth to one-sixth revolution. For all position of cranks when both pistons have to begin motion, the tractive force is less than that reached by an intercepting valve, because the pressure that drives the low-pressure piston keeps on the front side of the high-pressure one.

Also the Lindner apparatus is dangerous, when small movements are to be made on turntables, etc., with the low-pressure piston in working position, because the high-pressure valve chest is filled up with full boiler pressure, causing the engine to make a full

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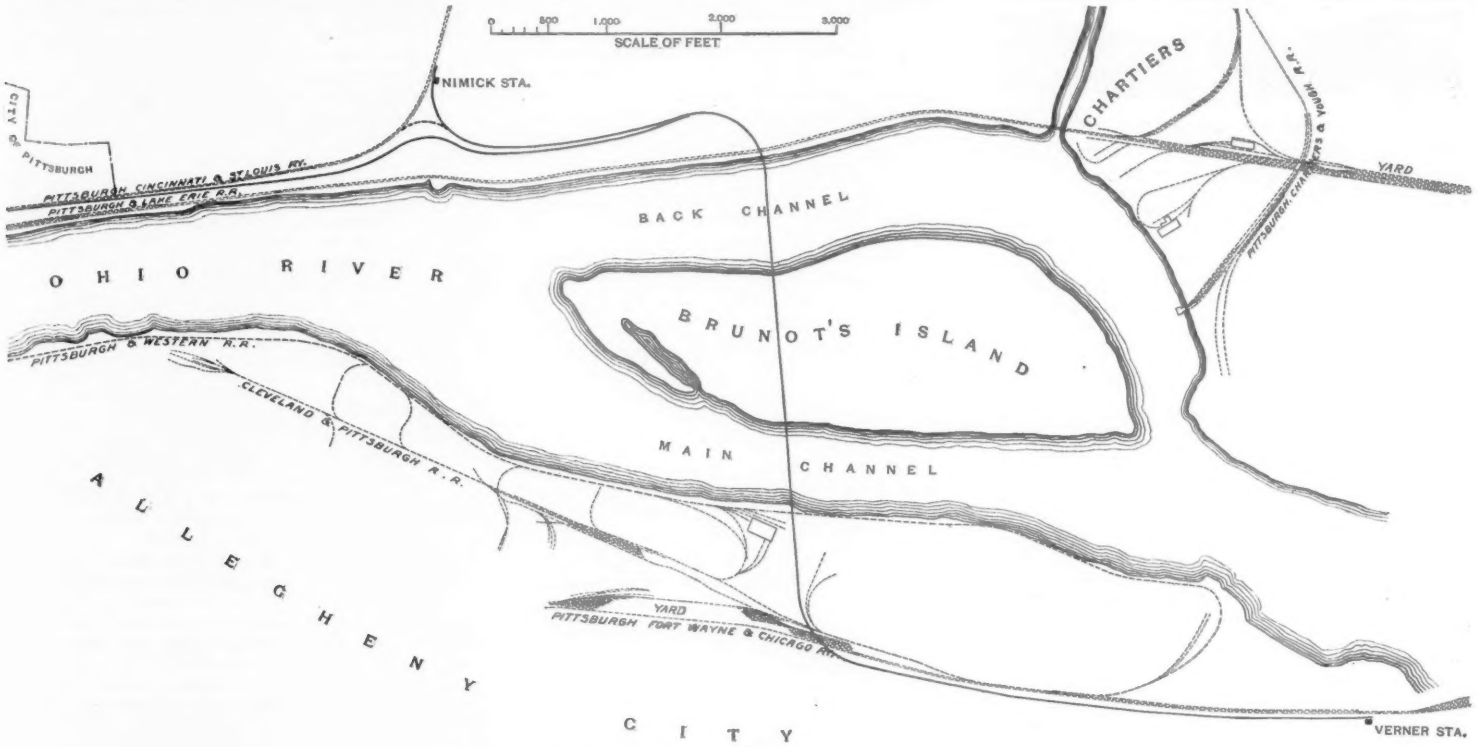


OHIO CONNECTING RAILWAY.—SKETCH MAP OF LOCATION.

[Broken lines are existing railroads. The heavy, full line is the Ohio Connecting Railway.]

start when this piston comes to work after one-eighth to one-sixth revolution.

Till 1884 I also believed one could get sufficient tractive force without intercepting valves, but, after having tried nearly all possible modifications, I found it indispensable to get a sure start. VON BORRIES.

Ohio Connecting Railway and Bridge at Pittsburgh.

[WITH AN INSET.]

The sketch map shows the general plan of the location of this railroad, and on the inset is shown the bridge in considerable detail. The object of the line is to take the coal traffic from the Pittsburgh, Virginia & Charleston Railroad (Pennsylvania system) to the line of the Pittsburgh, Fort Wayne & Chicago, and thence to the Lakes, without passing through the city of Pittsburgh. Connection is made with the main line of the Pittsburgh, Cincinnati & St. Louis at Nimick station, to take the coal traffic from that line and its branches to the Fort Wayne, also without passing through the city. The line leaves the Pittsburgh, Cincinnati & St. Louis on the south side of the Ohio River in the city of Pittsburgh, near the western limit of the city; thence it runs parallel with the line of the Pittsburgh, Cincinnati & St. Louis, but on a lower grade, to the south approach of the Ohio River bridge, and crosses the south channel of the river to Brunot's Island, and then over the main channel of the river to the north shore. There a deck span, a viaduct iron trestle, and two truss spans carry the line over the Pittsburgh & Western and the yard tracks of the Pittsburgh, Fort Wayne & Chicago to the bluff in Allegheny City. Thence it descends to the level of the main tracks of the Fort Wayne at Verner station. Beginning on the Pittsburgh side the bridge structure consists of two 126-ft. deck spans, on an 11-degree curve; then a through span, 416 ft. long, over the south channel. Then there are 11 deck spans, 174.72 ft. each, over Brunot's Island, followed by the main channel span, 525 ft. long. Flanking this there is a deck span of 140 ft. The line is then carried by iron trestle 975 ft. and two deck spans of 180 and 152 ft. each to the bluff.

The foundations present no difficulties. The deepest are but little over 40 ft. below the normal level of the pool. The foundations of the two main spans are carried down to rock. The foundations of the viaduct across Brunot's Island are carried to the gravel. The trestle foundations are on clay. The masonry is all built of sandstone from the Beaver Valley quarries. The substructure was built, under contract, by Messrs. Drake, Stratton & Co., of Pittsburgh. The superstructure of the channel spans, of the deck spans across the island, the deck span north of the main channel span and the two deck spans south of the south channel span are building, under contract, by the Keystone Bridge Co. The viaduct and the trussed spans over the Fort Wayne are building by Mr. C. J. Shultz. The grading of the approaches was contracted to Mr. W. E. Howley. Mr. Max J. Becker, Chief Engineer of the Pennsylvania lines west of Pittsburgh, southwest system, is Chief Engineer of the Ohio Connecting Railway Co.

The line now under construction is that portion between the junction with the Panhandle at Nimick station and the Fort Wayne at Verner station, and does not embrace the low grade line connecting with the Panhandle on the Pittsburgh side, which will be built at a later day. The length of line now building is 2½ miles and its cost is estimated at $1,200,000.

The Superstructure.—The part of the work which we shall particularly describe here is that portion of the superstructure for which the Keystone Bridge Co. has the contract—that is, 16 spans, in all about 3,300 ft. This was designed by the Keystone Bridge Co., Mr. C. L. Strobel, Chief Engineer, for given heights of piers. The masonry for all spans is of sufficient width to accommodate a double track bridge, but no provision has been made in the superstructure for double tracking. In the case of deck spans there would be small waste of material in a change to double track. The present trusses could be used with two additional ones, the latteral bracing changed and the floor beams extended over the four trusses. In the case of the main spans the problem of a future change to double track is a more serious one, but it was concluded that it was best to build single-track spans regardless of the future, and when the time comes to convert the bridge into a double track structure the cheapest plan will probably be to take down the old spans, sell them for their scrap value and build the double track spans entirely new. This plan has been followed in this case.

The floor beams are placed on top of the upper chords, for the deck spans, with lateral bracing connected to a plate inserted between floor beams and chords. The stringers are riveted between the floor beams. This arrangement is considered more satisfactory and efficient than the alternative one of riveting the floor beams to the posts below the upper chords. To make up for the height lost by this arrangement, and to attain the greatest economy in the proportioning of the trusses, the lower chord for the 175 ft. spans was made to reach down below the level of the tops of the piers, so as to give the trusses at the middle three panels a depth of 30 ft. By this arrangement there is no loss in stability as against wind pressure or otherwise. These 175-ft. deck spans were given a lower support on the piers next to the through spans by providing a recess in these piers. In this way the symmetrical appearance was preserved, and the eleven 175-ft. spans could be made entirely alike.

The stringers in the entire bridge have been placed at a uniform distance of 6 ft. 6 in. between centres, which is the railroad company's standard. This distance permits of fastening the guard rail and cross-tie by means of a single bolt to the stringer. This bolt is a hook bolt, the hook taking hold of the underside of the stringer at its outer edge. Lateral bracing of 3-in. × 3-in. angles is used between stringers.

The stringers in this bridge have been made continuous by riveting a splice plate to their top flanges at the floor beams. This splice plate passes through a slot cut in the web of the floor beam. The only object in providing this splice plate is to prevent a pull against the rivet heads at the connection of the stringers to floor beams. Without such splice plates the deflection of the stringers, especially where two adjoining panels are simultaneously loaded, has a tendency to loosen the upper rivets. The splice plates used are 12½ in. × $\frac{7}{16}$ in. × 3 ft. 11 in. in size, connected by 28 rivets at each joint.

The through spans are of the Pratt type with sub-trussing. The web bracing is light for this type of truss, and the small number of posts in the web bracing makes the erection somewhat more expensive, and increases the difficulty of providing an efficient connection of the lower lateral bracing to lower chords. These drawbacks, however, are more than made up by the saving in material.

The system of lower lateral bracing used for the through spans of this bridge has, it is believed, some novel features. Except in the panel at each end, the diagonals are made to run over two panels, taking hold of the truss pin at its centre only at panel points where there is no post. At the panel points where there is a post, there is no connection of lateral rod to pin. At these points the floor beams are held by a connection plate, which passes through a groove cut in the web of the floor-beam at its center and is riveted to the floor beam by connection angles. The floor beams at the panel points where the lateral rods are connected to the truss pins are forked; the lower chord consists of four angles instead of the usual two. The connection of lateral rods to truss pin and to floor beam is made by means of a U plate, as shown. This U plate is riveted to both pairs of lower chord angles. The curves to which these angles are bent are gradual, so that the bending could be done cold. This system of lower lateral bracing, it will be seen, is as efficient as could be desired, equal to the efficiency with which the truss members are connected to each other in the vertical plane, and no extra material is required over and above that in the lateral rods and their connections. The pins in this case have been figured for the bending from vertical load and wind strains both.

Specifications.—The specifications for materials and workmanship for this bridge do not present new features. The material used throughout, except for some minor members of light section, was Bessemer steel, made by Carnegie, Phipps & Co., Limited. The physical qualities stipulated were the following:

Ultimate strength, 62,000 to 70,000 lbs. per square inch.

Elastic limit, not less than 35,000 lbs. per square inch.

Elongation in eight inches, 20 per cent.

Reduction of area, ¾ in. rounds, 45 per cent. at point of fracture.

The rivet holes were reamed.

The loads provided for are two engines weighing 107.5 tons each, followed by a train load of 4,000 lbs. per lineal foot for the deck spans, and two engines weighing 92.3 tons each, followed by a train load of 3,000 pounds per lineal foot for the two through spans. These latter spans were made lighter, because it is expected that the bridge will have to be made double track after a limited number of years, and the material in these spans will then have scrap value only. The heavier loads for the deck spans are intended to make provision for future increase in rolling loads.

Erection.—At the present time the 140 ft. deck span and several of the 175 ft. deck spans are erected in place.

It was intended at first to erect the two through spans in the usual way by building falseworks supported upon piles across the channel, and erecting upon these. The law provides that in bridges built across the Ohio River there shall be two through spans, and that one of these spans shall be open to navigation while the other span is blocked with falseworks during its erection. In the present case, however, boats would have much difficulty in using the 416 ft. span while the 525 ft. span is blocked, and it was decided to erect the 525 ft. span if possible in some way that would cause little or no interference

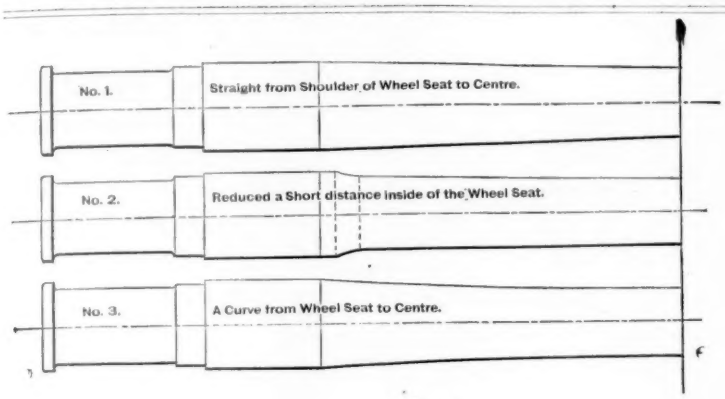

No. 1.
Straight from Shoulder of Wheel Seat to Centre.
No. 2.
Reduced a Short distance inside of the Wheel Seat.
No. 3.
A Curve from Wheel Seat to Centre.

Fig. 1.

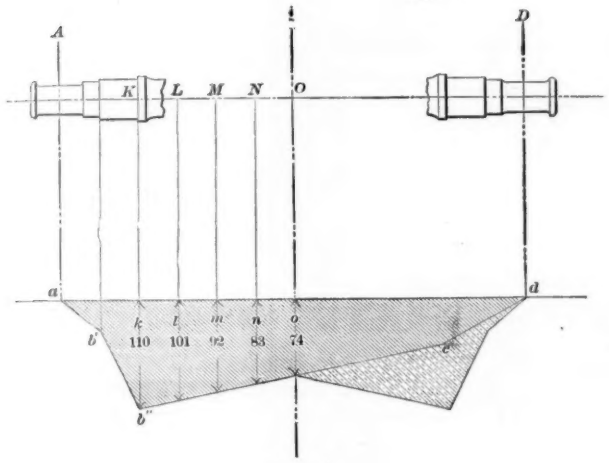


Fig. 3.

on your cirbular is the most correct, I would give you the following demonstration:

A D is the center line of the axle (fig. 2) and S is assumed to be the centre of gravity of the car. If the car weighs 80,000 lbs. loaded, each axle would support a weight of 20,000 lbs., represented in the diagram by *Q*. Besides this weight, each axle is acted upon by a horizontal force H, caused by the centrifugal force in curves and by the swinging motion of the car. This force *H* has by Adam Scheffler's experiments at Braunschweig, Germany, been found to be as high as 0.4 of the load.

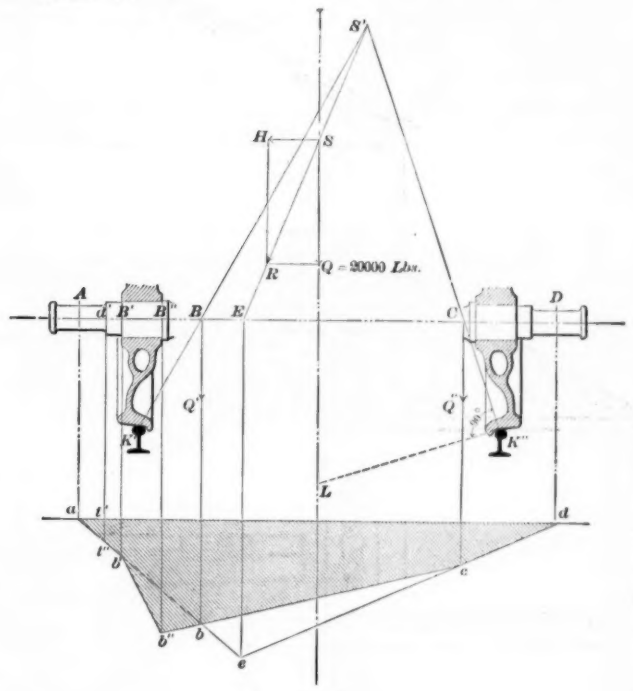


Fig. 2.

WITH REPORT OF THE MASTER MECHANICS' COMMITTEE ON AXLES FOR HEAVY TENDERS.

with navigation through that channel. The following method was proposed by Mr. C. L. Strobel on behalf of the Keystone Bridge Co., and adopted by the railroad company, and a contract entered into for doing the work. Falseworks up and down stream, below the pier, on the island side of the channel, are to be built. These falseworks are to rest upon piles and to be built up to a height a little above the final position of the span when resting upon its piers. After the span has been erected upon these falseworks in the usual way, coal barges are to be inserted underneath the falseworks and between the rows of piles, nine boats for the span. These boats are partly filled with water before being placed under the falseworks, and when in this position are pumped dry. Falseworks and span are by that means lifted clear of piles and are then floated out and towed into position between the piers. By allowing water to run back into the barges the span will be lowered on to the piers. In this way the river channel will be blocked not over one or two days.

The Ohio River at Pittsburgh is subject to extreme and very rapid changes of level, and this method of proceeding would hardly have been feasible but for the existence of the Davis Island Dam a few miles below the bridge. By the help of this dam a pool level can be maintained at the low stages of the river. It is intended to wait for a pool level stage of the river before attempting the floating of the span. At this stage there will, of course, be little or no current. Whether the 416-ft. span will be erected in the same manner or upon falseworks by the usual method has not yet been decided upon.

One advantage incident to the above method of erection is that work can be done in the river at a season of the year when it would be too risky ordinarily to attempt to erect the span. The recent accident at Wheeling illustrates the danger of erecting a bridge over the Ohio River at the present season of the year. The same flood which swept out the falseworks of the channel span at Wheeling did not damage the falseworks of the 525 ft. span of this bridge. As these falseworks are built up and down stream and near the shore, they are comparatively safe from risks of this kind.

It was first intended to erect this span direct upon barges or pontoons, as has been done in several instances heretofore, but the risk involved in holding so large a structure afloat through wind and weather during a protracted period was considered too great. It should be remembered that the top chord of this span is 140 ft. above the water's surface, and that the weight of iron and falseworks to be carried by the boats is not far from 2,000 tons.

Axles for Heavy Tenders—Report of Master Mechanics' Committee.

Your committee to whom this subject was referred sent to the members of the Association and others questions as to the kind and dimensions of axles preferred, and asked which one of the three forms in use (given below) was approved.

By a heavy tender your committee understands one that, when loaded, will carry, say, about 3,600 gallons of water and about 16,000 lbs. of coal.

To this circular your committee have received 36 answers, and of these 17 are in favor of the Master Car-Builders' standard axle for cars of 60,000 lbs. capacity, as adopted last year; 10 are in favor of the same general form of axle with slight changes in the dimensions, but no two of these ten agree; three favor the M. C. B. axle for 40,000 lbs. capacity cars. Thus we have 30 replies in favor of axles with collars and the remaining six in favor of axles without collars. Of the dimensions given by those in favor of the collarless axle, no two are agreed, nor do they agree in regard to the end stop, as each has a different design.

There are 20 answers to the question of limit of weight per square inch of contact, and these vary from 170 lbs. to 350 lbs., showing a wide diversity of opinion.

Your committee would recommend 300 lbs. as a safe standard for limit of weight per square inch of contact, and recommend that this contact be equal to the diameter of the journal. With a journal 4¼ in. by 8 in. the weight per square inch of contact, with a tender of the dimensions in our circular, would be about 225 lbs. per square inch; this would vary according to the construction, but there would be ample margin for safety and good results as to wear.

To the question as to the form of axle between the wheels, there are 13 for form No. 1, two for form No. 2 and 13 for form No. 3, making 28 answers to this question. Your committee are of the opinion, however, that form No. 1 is the correct one. We found that the Pennsylvania Railroad had noted on their blue prints the adoption of form No. 1, and your committee asked from Mr. A. S. Vogt, Mechanical Engineer, Altoona, and from Mr. Edward Graftstrom, Chief Draughtsman of the Pittsburgh, Cincinnati & St. Louis, and Chicago, St. Louis & Pittsburgh, the reason which led to the change and attach their answers to our report.

Your committee would then recommend the adoption of the Master Car Builders' axle for cars of 60,000 lbs. capacity, with form No. 1 between the wheels as of the proper dimensions and form 4 an axle for heavy tenders.

This will be also in the interest of economy, as the car and tender axle of heavy capacity will be interchangeable and no special axle for this purpose will have to be carried in stock.

(Signed) W. SWANSTON,
W. GARSTANG,
JAS. MAGLENN,
L. R. POMEROY,
Committee.

The following are the letters referred to in the report.

Mr. A. S. Vogt writes:

There has from time to time been much complaint about axles used by the Pennsylvania Railroad Co. being weak, and we have a few of the large size with 4 x 8-in. journals broken in service. This break has generally taken place, especially in the iron axles, half way between the centre of the axle and the inside hub of the wheel; this is also a favorite place for the axle to bend. Some time over a year ago we made a very thorough investigation of the dimensions required for car truck axles, taking into consideration not only the static loads, but also the shocks to the flanges of the wheels caused by the striking of curves and points of the frogs in yards, also allowing for the forces acting in a horizontal direction through the centre of gravity of the car, all of which make it necessary to make the large diameter of the axle directly at the inner end of the wheel fit, but the same investigation als shows that the axle can be gradually diminished in diameter toward the centre: this reduction in size proceeds in a way which causes the outline of the axle to assume a curve, resembling a very flat parabola. The trouble has been with our axles in the past that they did not receive any mathematical investigation, but were simply guessed at, and although the shape approached a true one, it was not quite right; this curve was the principal error, and the investigation showed that it should be a great deal flatter than we had it, in fact, nearly a straight line, and we made it so. That part of the axle, therefore, resembles two truncated cones joined at the small end.

I think you will also find that a shape proposed by the Master Car Builders as their standard for the 60,000 lbs. cars is the same shape, and this form of axle is shown on plate No. 8, and described on page No. 211 of the Master Car Builders' Report of 1889.

Mr. Edward Grafstrom writes:

Referring to your inquiry, why the first form of axle shown on your cirbular is the most correct, I would give you the following demonstration:

A D is the center line of the axle (fig. 2) and S is assumed to be the centre of gravity of the car. If the car weighs 80,000 lbs. loaded, each axle would support a weight of 20,000 lbs., represented in the diagram by *Q*. Besides this weight, each axle is acted upon by a horizontal force H, caused by the centrifugal force in curves and by the swinging motion of the car. This force *H* has by Adam Scheffler's experiments at Braunschweig, Germany, been found to be as high as 0.4 of the load.

The resultant of the force *H* and the weight *Q* is represented by the line and direction *R*.

If *R* is divided into components going through the rail heads, it is apparent that the component, through the rail *K''* from which *H* is turned must be normal to the surface of the rail in contact with the wheel, or in other words, the force *R* must be moved upward in its own direction until the angle *S' K'' L* is equal to 90 degrees. The two components of *R* would then act along the lines *S' K* and *S' K''*. These lines intersect the centre line of the axle at *B* and *C*, and are here divided into vertical components *Q'* and *Q''*, besides horizontal components, which may be left out of consideration, as they do not affect the axle.

From the point *E*, where *R* extended intersects the centre line of the axle, a vertical line *E e* is dropped to some point *e* below a line *a d*, drawn parallel to the axle. Points *a* and *d* are the projections on this line of the centre points of the journals, so that *a d* is equal to *A D*, and *a* and *d* are connected with *e*, forming the triangle *a d e*. *Q'* and *Q''* are extended to *C* and *e*, which points are connected by the line *C e*. If vertical lines are now drawn from the wheel fit *B' B''* to points *C'* on *a e* and *C''* on the extension of *C e*, then the polygon a *C' C'' e d* is formed. This polygon determines the correct axle for the weight *Q* and the force *H*, as will be shown. But as *H* is liable to act in either direction, and both halves of the axle must be made alike, the polygon takes in reality the shape shown on diagram No. 2.

"In order to ascertain the shape of the axle, the distance between the wheel fits is divided into a number of equal parts (see fig. 3). From each of these divisions points a vertical line is drawn through the polygon. According to F. Reuleaux, the diameters of the axle at the different points *K, L, M, N* and *O*, stand exactly in the same proportion to each other as the cubic root of the distances *k, l, m, n* and *o*, or expressed mathematically:

$$\frac{\text{Diameter at } K}{\text{Diameter at } L} = \sqrt[3]{\frac{k}{l}}$$

In the case of the Master Car Builders' axle the diameter at *K* is 4¾ in., *k* scales on the diagram 110 and *l* scales 101 hundredths of one inch. Thus:

$$\frac{4\frac{3}{4}}{\text{Diameter at } L} = \sqrt[3]{\frac{110}{101}}$$

And diameter at $L = 4.73''$.

In a similar manner the diameters at *M, N* and *O* are found to be 4.59 in., 4.44 in. and 4.29 in. respectively. If an axle is laid out according to these dimensions, you will find that it will conform very closely with the straight taper of the Master Car Builders' standard axle.

246,400-lbs. Traveling Crane.

The Morgan Engineering Co., of Alliance, O., have completed for the Navy Department, United States Government, the largest traveling crane in the world, although revolving cranes with equal or greater hoisting capacity have previously been built. Bids were asked for three cranes of 25, 40 and 110 gross tons capacity, but the Morgan Co. was the only bidder for the heaviest crane, and received the contract for all three. Fig. 1 shows both the 40-ton and the 110-ton cranes in position.

The building consists of 27 bents, spaced 8 ft. apart, centre to centre, each bent comprising a main roof truss of 62 ft. 2 in. span and 20 ft. rise, clear-story posts and framing 19½ ft. high; two gallery trusses, 16 ft. span and 10 ft. rise, all supported by the side walls and crane columns.

The supports or elevated track for the 110 gross tons crane consist of two parallel double lines of wrought-iron plate girders, spaced 59 ft. 2 in. from centre to centre of webs of inside girders; the two lines of girders forming each double line spaced 2 ft. 6 in. from centre to centre of webs. These girders are supported upon double columns, with caps and base plates, braced longitudinally to each other and laterally to the walls of the building and resting upon concrete piers. The tops of rders are 40 ft. above top of floor. The total length of

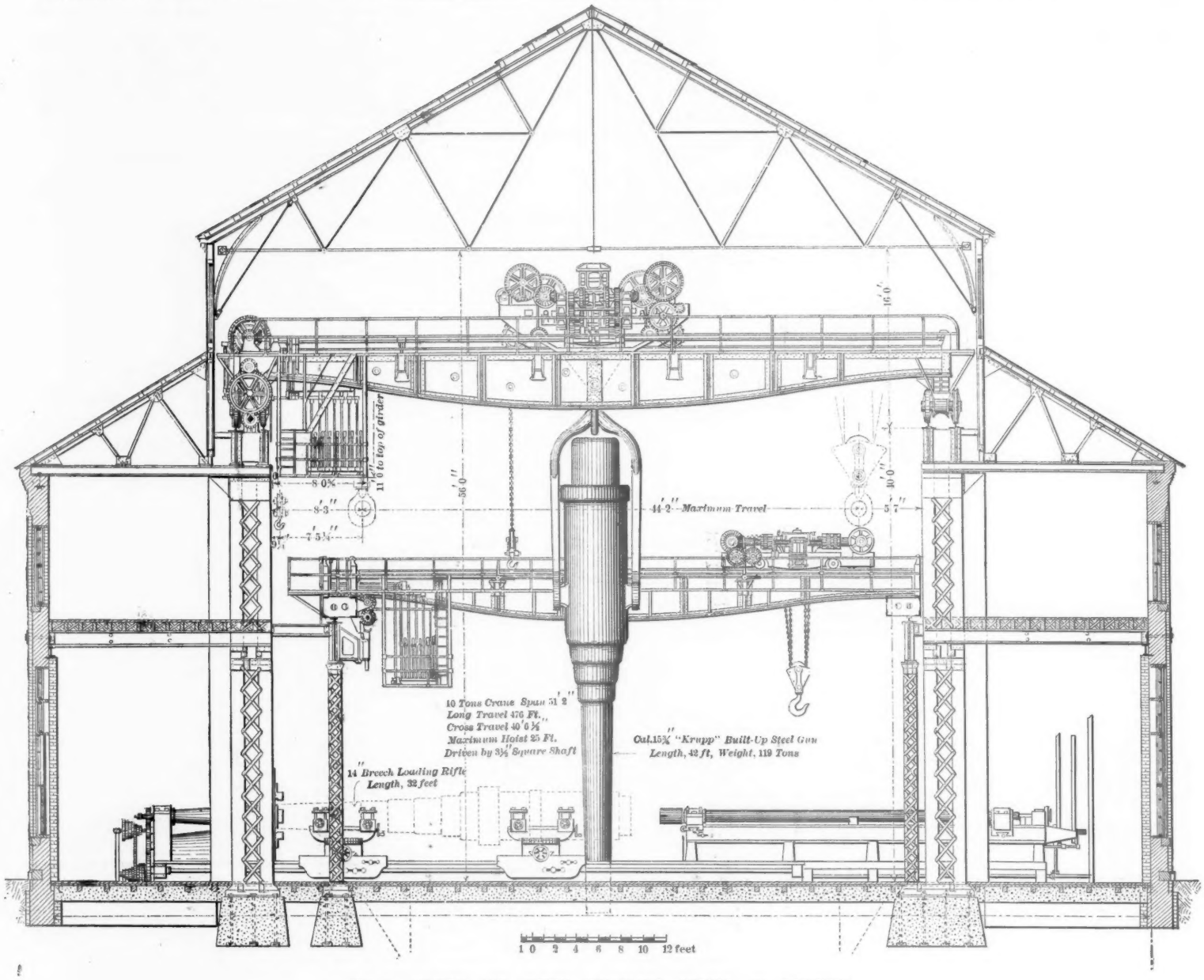


FIG. 1.—110-TON AND 40-TON TRAVELING CRANES, IN POSITION.

each double line of girders is 208 ft. from centre to centre of end columns, divided into 13 panels of 16 ft. each; columns 28 in number and 38 ft. 3 in. long from planed base to upper surface of cap. Each consists of two columns latticed together as shown. Each single column is composed of two 12-in. channels, 120 lbs. per yard, and two plates ¼ × 14 in. These columns are made perfectly straight, and when riveted together were true and free from the slightest twist or bend.

Each column has the base and capital planed smooth and square to the centre line of the column and each column is made precisely the same length; base of columns bolted to base plates. The caps of columns, 28 in number, were planed smooth and square to the central axis of the column to receive ends of girders. The base plates, 28 in number, are of two sizes and are accurately planed for bearing surface of the column base. All stiffeners and filling pieces in girders have accurately planed ends and make close butt-joints against top and bottom flanges. No splicing is allowed in any girder; each piece is made continuous throughout the entire length. Girders are braced together and bolted to the caps of the columns.

At a height of about 19 ft. 9 in. from the top of the floor there is on each column a connection, as indicated in drawing, two 15-in., 200 lbs. per yard, I-beams, attached to the inner faces of the single columns and extending longitudinally through the spaces between the two columns, composing each double column, from double column to double column throughout the entire length of the building. These beams are firmly secured together by cast iron separators and bolts.

Resting upon these I-beams, close against each side of each double column, and also midway between the columns, is a 15-in., 156 lbs. per yard, I-beam, extending horizontally and at right angles to the line of the columns to the wall, to which it is secured by wall plates, bolts and washers. The pair of beams at each column is rigidly fastened together by cast iron separators and bolts.

Each quadrangle formed by the plate girders—the upper portions of the columns—and the longitudinal 15-in. I-beams are braced in each diagonal by a 1-in. round rod fitted with adjusting thread and sleeve nut.

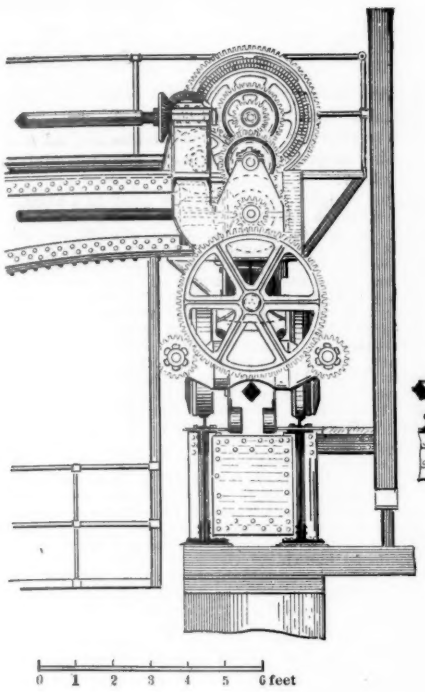
Against each side of the head of each column is attached a 9-in. 70-lb. I-beam, as shown, extending laterally to the wall, to which it is secured by anchors.

Fig. 2 shows the end truck supporting one end of the crane bridge. The figure shows plan, side elevation and end elevation. This truck is on the square shaft side of building, and upon it is the machinery for receiving and transmitting motions to the several transverse shafts parallel with the crane bridge driving trolley mechanism. The machinery on the truck controls two changes of speed for main hoist, for independent hoist, for transverse travel and for longitudinal travel, with powerful reversing clutches for reversing the travel of the crane on the track backward and forward. The truck is composed of one longitudinal box-beam built of 15-in. steel channels and I-beams, with the top and bottom tie plates in one continuous length and riveted together and planed smooth, top and bottom, for the true surface in securing the several parts. The ends of the crane girders are located 12 ft. from centre to centre, and directly beneath the box beam, are two separate truck carriages, with four steel wheels each. Securely bolted to the box beam are four cast-iron bearings having a convex surface, with shoulders at each end for contact with the same on each piece. These bearings are 39 in. long, 22 in. wide. The carriage frames are of cast-iron box section, and concave bearings to suit the male bearings, are secured to box beam. The object of this construction is to allow for compensation in the transverse direction of the building, in view of the possible deflection of the crane bridge under extreme conditions, or lateral deflection in longitudinal track, and prevents every possible opportunity of increasing an undue load on inner track wheels; to prevent undue strain by jamming or locking the teeth or changing the centres in spur wheels transmitting motion to the machinery above the box beam. The shafts above the box beam are central with the ends of the crane girders, and from the centre of these shafts the radii of the curves in these compensating bearings are formed. These bearings are truly turned and scraped, with deep spiral grooves, with cored reservoirs in the lower bearings for waste to saturate with oil for lubricating. The large intermediate or "Idler" spur wheels transmitting motion from the square shaft to the machinery above the box beam, and the same on the opposite end driving bridge travel, are fulcrumed and secured as part of the lower trucks, thereby allowing an independent motion of the box beam with the machinery above and each lower wheel truck without binding of parts.

The steel track wheels on the separate truck not driven revolve loosely on axles, having steel bushings hardened in oil, with hardened steel roller or pin bearings. The axles are stationary and secured to the truck frame. On the driving end the steel track wheels are keyed to the axles, and these revolve loosely in the frame having steel bushings hardened in oil, with hardened steel roller or pin bearings. These steel track wheels have large bevel wheels securely keyed and bolted and driven by steel bevel-pinions, and are driven as shown on both sides of the truck frame.

The main 4-in. square driving shaft is located between the parallel girders, on one side of the building track, over which the trucks travel and receive motion.

The crane bridge is composed of two-box section, wrought-iron, curved girders. Total length, 63 ft. 5 in.; depth at each end, 28 in.; depth in centre, 60 in.; width of top and lower flange, 29 in.; web plates, 16 in. centre to centre. The top and bottom covers are composed of two wrought-iron plates, 29 in. wide, $\frac{9}{16}$ in. thick; total 1⅛ in. The web plates are 9/16 in. thick, secured by internal and external angles 6 in. × 6 in. × 1 in. thick. The cover plates and angles are in one piece of continuous length; the web plates in four pieces with the ends and top planed to insure accurate butt joints, united by 15 × ⅝ in. splice plates. The bottom end of the web plates is truly chipped even with angles to receive cover plates which are secured by ⅝-in. diameter rivets. All other parts are secured by ¾-in. diameter rivets. Cast-iron distance pieces are placed between the webs at intervals to suit the shape, secured by 1-in. through bolts with cast-iron washers on the outside of webs. The quality of iron required in these crane girders was of the best, tough, fibrous, ductile and uniform in quality. The required limit of elasticity was not less than 26,000 lbs. per sq. in. (The attention of bidders was called to the fact that the elastic limit was one of the most important points in the quality of materials.) The test specimens, when taken from the angle or other shaped iron of less than 4½ sq. in. sectional area, required to have an ultimate resistance of not less than 50,000 lbs. per sq. in



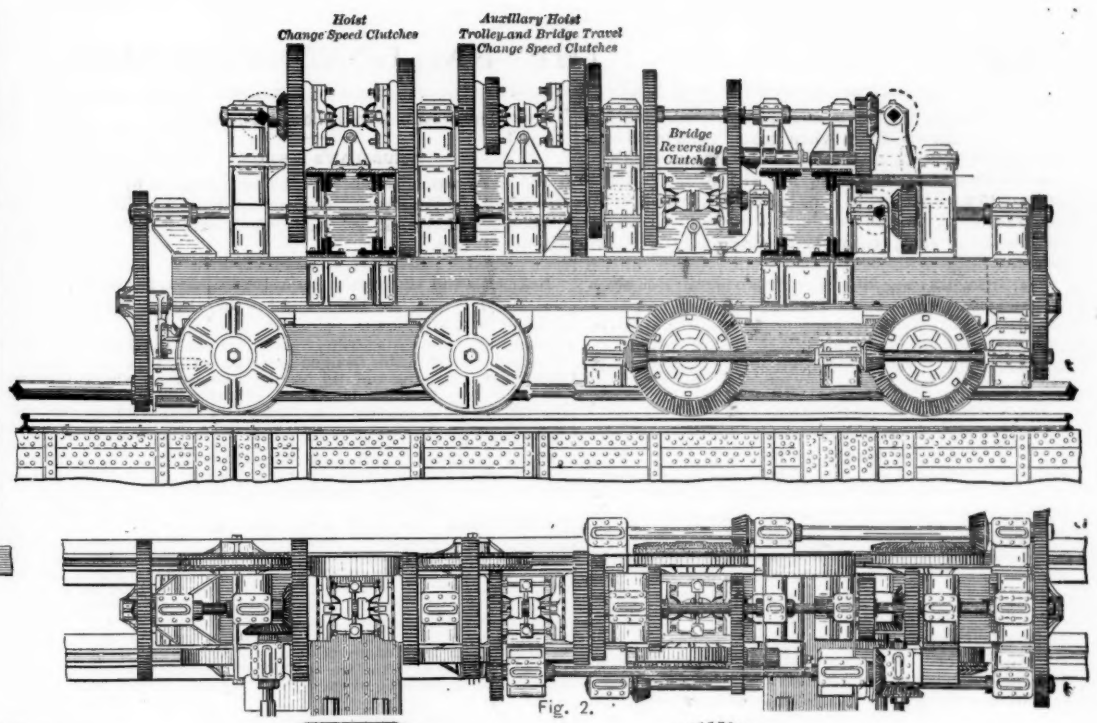


Fig. 2.

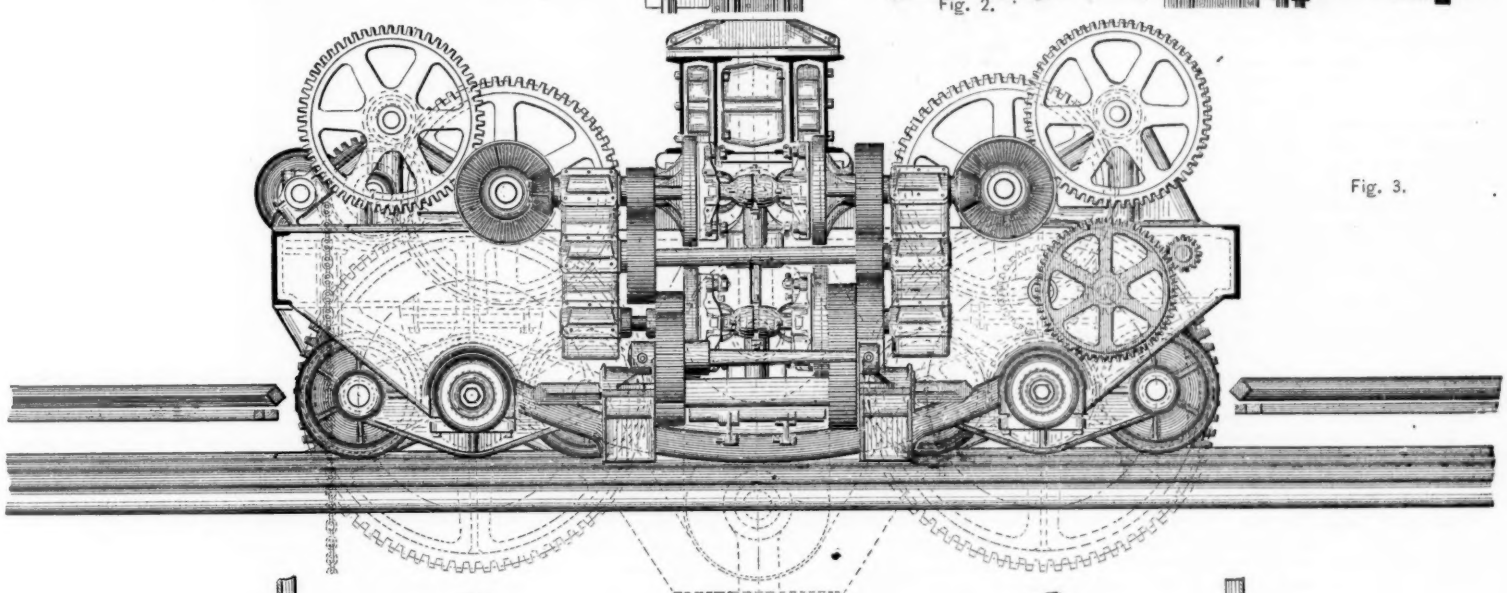
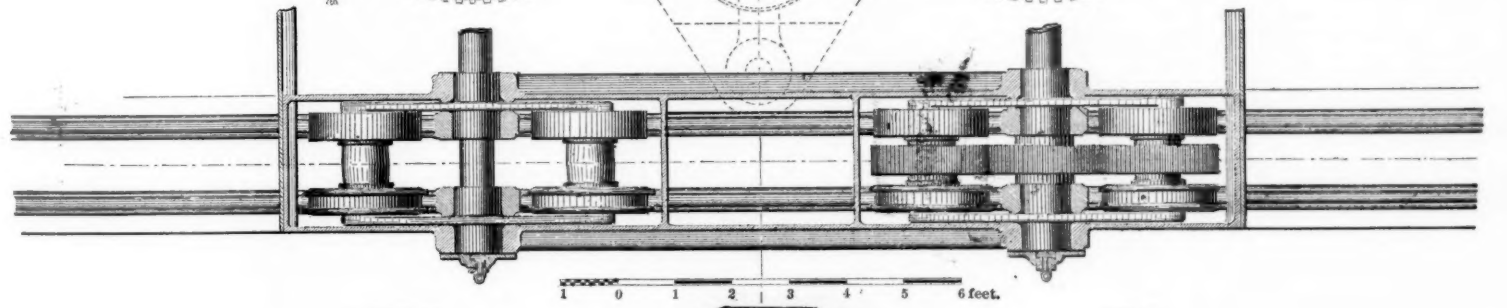


Fig. 3.



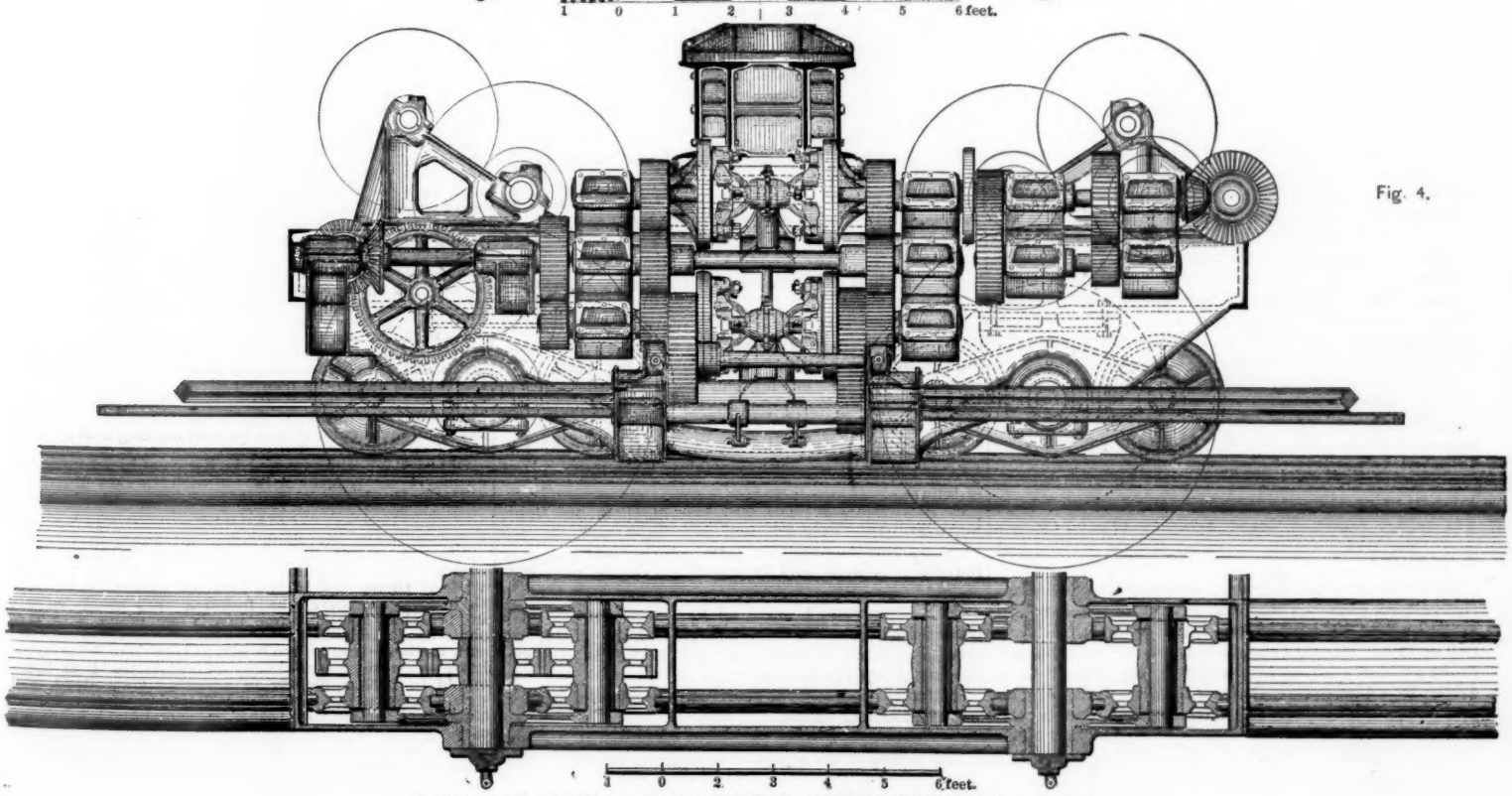


Fig. 4.

DETAILS OF 110-TON CRANE.—BY THE MORGAN ENGINEERING WORKS.

with an elongation of at least 15 per cent. in a length of 8 in. A similar specimen when taken from plate iron, not over 24 in. wide, required an ultimate strength of not less than 48,000 lbs. per sq. in., with an elongation of at least 15 per cent. in 8 in. The reduction of area in every case required to be not less than 20 per cent. Each girder, without rails, brackets or machinery, weighed about 24 tons.

Fig. 3 is a drawing representing a general side elevation of trolley, with machinery for reversing and changing the speed of the main hoist. It also shows a sectional plan through the main axles and trolley frame, the manner of construction and location of equalizing beams securing track wheels.

Fig. 4 is a drawing representing a general side elevation of the trolley, with machinery for reversing both the travel of the trolley to and fro on the bridge and the hoisting and lowering of the independent or auxiliary hoist. Also shows a sectional plan through the main axles, trolley frame and equalizing beams—the manner of construction.

The 3 in. square shafts parallel with the crane bridge are supported by four "Morgan" automatic drop bearings on each side of the crane bridge, and are thoroughly positive in their action in raising and lowering to allow trolley to pass and repass on bridge, and are noiseless in their action. The respective speeds of these square shafts are 75 and 150 revolutions per minute. One of these shafts is to drive the main hoist only; one to drive the trolley travel and auxiliary hoist only. In addition to these parallel shafts there is a 4-in. diameter shaft for driving two sets of duplicate gearing; one set on each end truck for propelling longitudinal travel of the crane squarely on the track. This shaft is held in adjustable bearings, secured rigidly to one side of the crane bridge. A splendid feature of this crane is the parallel square shafts with bridge for manipulating the several motions in the trolley from a suspended cage at the end and on one side of the crane bridge. These several square shafts are threaded through bronzed sleeve spur levers, held secure by a bracket to the trolley frames on each side, and it matters not whether the trolley is traveling or stationed at any point on the bridge, the trolley motions are under full control of the operator.

This valuable feature was patented by T. R. Morgan, Sr., December 18, 1883. It is in use on all cranes built by this company, having several changes of speeds for hoisting. It is also used by one other maker to effect the same purpose for overhead cranes.

The transverse bridge beam on the trolley frame is composed of four 20-in., heavy section, steel I-beams, built up as shown, for sustaining the main chain, sheave blocks and load. This bridge, at each end, rests upon bracket bearings on the trolley frame, having a convex and concave surface, similar to the end trucks supporting the crane bridge, and the object, to allow a deflection of the bridge when sustaining the maximum load and to prevent the binding of the trolley frames against the machinery.

The total length of the chain rove through sheave blocks, and coupled to drum, is 600 ft. of 1¼-in. short link crane chain in one piece or length, made specially by Messrs. Bradlee & Co., Philadelphia, Pa. The total weight of the chain, sheave blocks and sling link, independent of the trolley beam, is about 16 tons.

A very important feature of the trolley, specially the mechanism for reversing the hoist, is the two sets of automatic differential brakes for sustaining the load. The differential parts are not new, as they are used extensively both in this country and abroad. They possess excellent points of merit when kept in order and are not allowed to "stick." These several features, due to carelessness, will cause no danger, but annoyance in extricating. All these points have been thoroughly mastered by the Morgan Engineering Co., and the manner in which the several parts have been designed to overcome these difficulties, and the connection of parts to be operated by the same movement operating the reversing mechanism, is certainly creditable. When hoisting, the brakes disengage automatically; when stopped, the brakes hold automatically; when lowering by power, the brakes are disengaged; when lowering at various speeds at will of the operator, the brakes are disengaged. Should any connection between the brakes and the operator break, they automatically engage and sustain the load. This feature is also embodied in the auxiliary hoisting mechanism in the trolley.

The crane complete is carried upon end trucks, having 16 36-in. diameter steel track wheels. The speeds for main hoist are as follows: 1 ft. per min., 150 tons; 2 ft. per min., 75 tons; 4 ft. per min., 37½ tons; 8 ft. per min., 18¾ tons, respectively.

The speeds for independent or auxiliary hoist are as follows: 15 ft. per min., 10 tons; 30 ft. per min., 5 tons. The trolley travel on crane bridge is: 25 and 50 ft. per min. The bridge travel on elevated track is: 30 and 60 ft. per min.

The crane motions entire are controlled by seven upright levers, as shown and stand vertical when not in action; when forward or backward controls, there are two motions. The entire crane in every part is estimated to lift and carry 150 net tons at the lowest speed. It is driven by a 4-in. square shaft, with 48-in. diameter friction pulley, 12½-in. face, and driven by 12-in. double belt.

The total weight of crane, complete, is about 200 tons. It required 16 cars to ship to its destination.

The Master Car-Builders' Convention.

THURSDAY'S SESSION.

The first action taken was the appointment by the President of a Committee on Correspondence and Resolutions, as follows: R. W. Wade, Chairman; E. B. Wall and W. H. Day.

JOURNAL BOX AND LID.

Next followed the report on A Journal Box, Bearing and Lid for 60,000-lb. Cars, and Lid for Old Standard Journal Box, as follows:

The committee respectfully submit for your consideration and adoption the designs herewith of a proposed journal box, bearing and lid for 60,000-lb. cars in which the Fletcher lid may be either of malleable iron or pressed steel, as shown. The committee finds it advisable to make a larger journal box than the present standard, and it recommends the change shown in the wedge and brass for the new journal box, because this construction gives a full bearing of the wedge upon the brass, and is less liable to deform the brass when it becomes worn thin than in the old practice of concentrating the load upon the middle of the brass. The necessary clearance for rocking motion is provided between the wedge and the top of the journal box instead of between the wedge and brass, and the wedge must be of such strength as will serve to distribute the load evenly over the whole length of its bearing upon the back of the brass. This enlarged journal box has the opening for the lid maintained at such dimensions as would permit the use of the same lid on the new and the old boxes by a slight modification in the opening of the present standard journal box.

The committee, therefore, submits also a design showing the same lid whether made of malleable iron or pressed steel adapted to the present standard journal box, and recommends its adoption as standard for that box. No changes are made in this standard journal box, except in the opening, which has heretofore been incomplete on account of no means being shown for attachment of lid, and which the committee proposes to complete in such manner as will permit the use of the same lid as herein proposed for the new standard journal box for 60,000-lb. cars.

JOHN S. LENTZ,
F. D. CASANAVE,
R. MCKENNA,
J. N. LAUDER,
A. A. JACKSON. } Committee.

R. MCKENNA: I have objected to this report and signed it under protest. I do not want to see either this style of box or the pedestal bolts inside of the box. It is unnecessary for this size of box that it should be so.

F. D. CASANAVE: The reason why the bolts are inside of the box is because it is possible to use the same position of bolts as in the standard journal box, and yet have plenty of room for oil and waste. We believe it to be a mistake to make a larger box. It would increase the weight and cost. The committee think that if the box is strong enough it is as far as they care to go in change of design. There is plenty of room in it.

Mr. MCKENNA: This type of box is 17 years old. I want an independent box. We should do better for ourselves than this box after a lapse of so long a time.

C. A. SCHROYER: I move that this oil box be submitted to letter ballot. Seconded.

W. A. FORSYTH: This is not the Fletcher lid. That lid has a side hinge and a top and bottom bearing which keeps it from rattling. This one has a top bearing.

J. S. LENTZ: Last year the Fletcher lid was submitted to letter ballot and was adopted, but the form was rejected, and that is why the hinge was changed to the top.

E. W. GRIEVES: We have avoided the solid box truck, as we prefer the independent one. I agree with Mr. Forsyth regarding the Fletcher lid.

T. A. BISSEL: The lid offered is not the Fletcher lid. The Fletcher lid is by far the most popular. It has a bearing at the top and bottom to reduce the pounding. This new lid is an experimental one. The Fletcher is not. It has been almost universally adopted, and I don't believe that the objections raised last year had reference to the point of hinging the lid.

E. CHAMBERLAIN: This is purely an experimental lid. Wear would soon result in rattle. I hope this lid will not be accepted, because it would give us two kinds: one with top and one with side hinge point.

J. N. BARR: This recommendation cuts out the valuable feature of the Fletcher lid, and this association ought to adopt only what actual experience has shown to be first class.

C. A. SCHROYER: It is strange how experience will vary. I have seen the real Fletcher lid wear down three-eighths of an inch at bottom on a passenger truck. We now use a pressed steel lid, and hinge it at the top. It costs 50 per cent. less to put on than the malleable iron lid.

G. W. RHODES: I would ask Mr. Schroyer if the lids he finds wearing are not heavy lids. With light ones it is not so.

C. A. SCHROYER: Yes, but some of them are light, however. Our new lids are very light and we use the same heavy spring as before. This results in a great reduction of wear, and it stands to reason that this should be so.

W. A. FORSYTH: I move as an amendment to have these drawings changed to the regular Fletcher lid, and these submitted to letter ballot. The lid to have the bearing at top and bottom.

Motion carried, and the revised drawings were ordered referred to letter ballot.

STEEL AND IRON IN CAR CONSTRUCTION.

Next followed the report of Committee on Steel Plate and Malleable Iron in Car Construction. This paper was read in abstract. It was offered merely as a review of the subject and not as a recommendation. Extracts follow.

Taking the weight of castings now used in a 60,000-lb. car, say at 3,500 lbs., the reduction in dead weight would be 1,400 lbs. per car by the substitution of malleable iron. The durability of the material on account of its greater strength will commend it to those appreciating the cost of loss of service of cars on account of repairs to broken parts, to say nothing of the direct outlay of the renewal. The advantages of strength, lightness and durability being apparent, the question of cost arises.

Manufacturers state that for large orders for the building of cars, where the malleable iron would be used throughout, it could be produced and sold for three cents, or perhaps under that figure, per pound. Taking our weights of castings as above, the comparative cost would be per 60,000-lb. car as follows:

3,500 lbs., cast iron at $1.80 ..... $63 00
3,500 lbs. — 1,400 lbs. = 2,100 lbs. malleable iron at 3c. 63.00

Malleable iron scrap, however, is not so valuable as cast scrap, but malleable iron would greatly reduce the amount of scrap produced, so this question loses most of its weight. All the makers of the M. C. B. type of coupler have adopted malleable iron as the most durable and economical metal.

The strength of malleable iron castings depends very much upon proper proportion in designing the pattern. The following rules may therefore be of advantage to draughtsmen:

1. Never run abruptly from a heavy to a light section.
2. As the strength of malleable iron lies in the skin, expose as much surface as possible. A star-shaped section is the strongest possible form in which a casting can be made. For brackets use a number of thin ribs instead of one thick one.
3. Avoid all round sections; practice has demonstrated this to be the weakest form. Avoid sharp angles.
4. Shrinkage, generally, on castings will be $\frac{3}{4}$ of an inch to the foot smaller than the pattern.

The subject of this report is a general one, not accompanied by any specific instructions. We have therefore treated it in a general way, and the only matter requiring any action of the Association is in the direction of standard forms for various details made of pressed steel.

The diversity of shapes and sizes for pressed steel centre plates and stake pockets is now almost as great as that for cast-iron ones, and the subject should be further considered by a committee on "standards," so that these and other pressed steel details may be reduced to a few standard forms.

In conclusion, we desire to emphasize the following facts: First, that malleable iron castings possessing strength and durability far superior to cast iron and weighing considerably less per car, can, by reason of reduced weight, be purchased at about the same cost per car. Second, that the price of iron and steel beams, channels and plates is now low enough to make it possible to construct a flat, box or coal car of greater strength and durability of equal weight at a cost very little in excess of a wooden car. Third, the use of pressed steel makes it possible to construct steel cars with few parts and with shapes or forms especially designed and adapted for car construction of a material possessing the greatest strength for a given weight. For these reasons we believe that the extensive use of malleable iron and steel in the details of wooden cars will result in the gradual disappearance of wood, and that we expect in a few years iron or steel under frames and plate steel trucks will be generally introduced in the United States.

Committee, { WM. FORSYTH, JOHN MACKENZIE, E. D. BRONNER.

The committee was continued to another year.

LOADING BARK AND LOGS.

The report of the Committee on Loading Bark and Logs on Cars was read by Mr. Blackall.

The report was accepted and the standards recommended were ordered to letter ballot.

STANDARD HEIGHT OF DRAWBARS FOR PASSENGER CARS; SAFETY CHAINS.

The report of the committee on this subject was as follows:

STANDARD HEIGHT OF DRAWBARS IN PASSENGER CARS.

The committee has made extensive inqriry, and gives a table made up from information furnished by 52 roads, showing the number of cars equipped with the Janney, Miller, Cowell and Blackstone couplers. The table gives also the total number of cars, distributed under headings showing height of drawbars and the number of cars for each, measuring from top of rail to centre of drawbar.

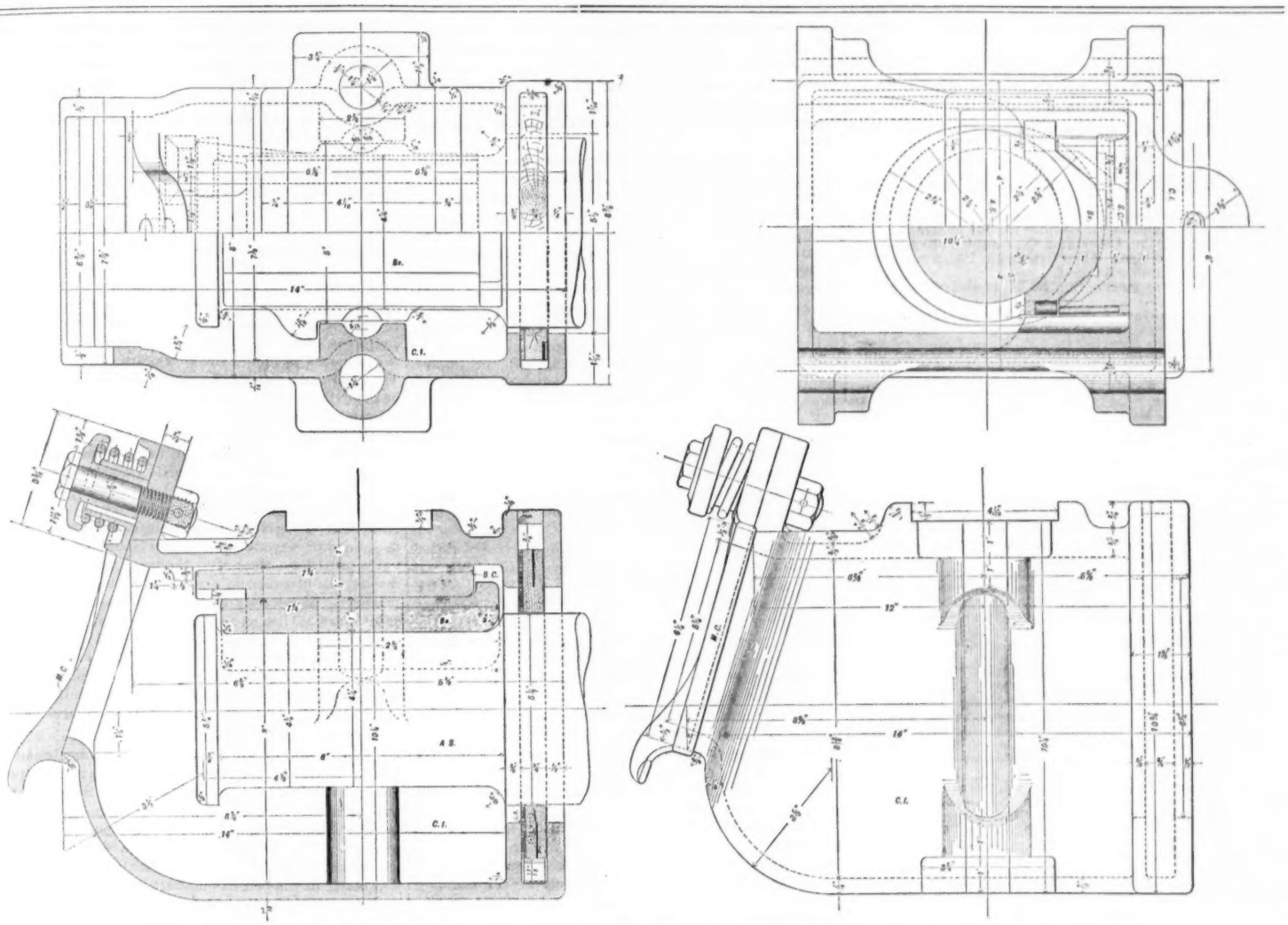
There are 13,726 cars reported, and of this number 7,668 cars have drawbars whose height is 35 in.; while there are 4,428 cars having drawbars below this height, and but 1,624 cars measure more than 35 in. Furthermore, it was found that there were 9,838 cars on which the height of drawbar could not be lowered, and that of the 1,624 cars now having drawbars above a height of 35 in 870 could be lowered to conform to 35 in., leaving but 754 cars out of the total number of 13,720 which could not be lowered without expensive changes.

As is shown above, a majority of the cars have drawbars 35 in. in height, and 4,428 cars are now below this and could be made to conform to it; and as the number above this height is comparatively small, your committee think it is expedient that there should be a change in the standard height of drawbars on passenger equipment cars, with a view to making it 35 in. from top of rail to centre of drawbar.

Of the 13,720 cars reported 4,625 are equipped with the Janney, 8,949 with the Miller, 20 with the Cowell and 126 with the Blackstone.

SAFETY CHAINS.

Inquiry into the application of safety chains has shown that on the roads reporting there are 9,604 cars on which they are used and 4,116 cars running without them. As to the form of safety chains and their location, there was found a very great variety in practice, there being nearly as many forms of chain used and points selected for attaching them to the cars as there were railroads using them. The differences, however, were so small that your committee think there would be little difficulty in adopting a standard, and would make as their recommendation the following for a standard for safety chains on passenger equipment cars, viz.: Links to be made of ⅝ in. round iron. One link, 4 in. long by 1½ in. wide, measured inside, to be attached to the right hand side of platform, facing the end



PROPOSED JOURNAL BOX, BEARING AND WEDGE FOR 60,000-LB. CARS.—MASTER CAR-BUILDERS' ASSOCIATION.

of car. A chain consisting of two links and a hook to be attached to left hand side of the platform, facing end of car. The link of this chain next to the platform to be 2½ in. × 1½ in., measured inside. The second link from the platform to be 3½ in. × 1½ in., measured inside; and the hook to be 4 in. long, taking the greatest distance measuring from the inside of the eye to the inside of the hook. The chain made up in this way having a total length of 10 in.

E. D. NELSON,
JOHN KIRBY,
H. MIDDLETON, } Committee.

The report was amended to make the height of drawbar 35 in. when the car is empty and was then ordered to letter ballot for adoption.

WHEELS.

A communication from the Wheelmakers' Association was read containing the following:

That this association accepts with satisfaction the action of the Railway Master Mechanics' and of the Master Car Builders' associations, upon the report of the Joint Conference Committee on specifications and guarantees for chilled cast-iron wheels, with the understanding expressed in the following preamble and resolutions:

Whereas, The wheelmaker has no control over the conditions of railroad service; and whereas, such conditions vary materially on different roads:

Resolved, 1. That in all mileage or time guarantees the wheelmaker ought to be held responsible only for wheels which fail through faults of material or workmanship.

2. That, when wheels are taken out of service on account of sharp flanges, flat spots, comby or shelled-out treads, or for cracked brackets or plates, and it is found, on breaking up the wheels, that the depth and character of the chill, and the strength and character of the metal in the plates, are up to the standard specifications adopted by the Joint Conference Committee of the Railway Master Mechanics', the Master Car Builders' and the Wheelmakers' Associations, it shall be considered that the failure is due to service and not to the quality of the wheels, and that the wheelmaker ought not to be called upon in such cases to pay for or replace any such wheels.

The matter was referred to the Wheel Committee, of which J. N. Barr is chairman.

J. N. BARR: The old committee has done but little except talk the matter over. We think it ought to be the subject of a special committee to go thoroughly into the matter, as it is an important proposed change. The wheelmakers ask us not to take into account wheels with sharp flanges, as that trouble arises from defective trucks, etc. Now, I don't think that this is true. A circular of inquiry ought to be issued regarding this point with a report at the next meeting of this association. Also, they ask us not to consider wheels with "comby" and "shelled out" treads. These are from defects in the castings. Again, they want wheels with "cracked brackets" excluded. Now, one wheelmaker may throw more work on the brackets than another, and unless the railroad companies specify the brackets they cannot be held responsible. "Cracked plates" may result from the application of the brakes, but to say that the wheelmakers ought not to be held responsible is too much. To wipe out that clause would put a premium on bad work and material. It is best that a committee be appointed to report next year, and I make a motion to that effect. Motion carried.

Mr. E. B. WALL then made a motion which was passed to the effect that a separate list be prepared of those roads that subscribed to the Rules of Interchange of Passenger Cars, and that these rules be printed on separate sheets.

Mr. Wall also offered the following motion, which was passed: That the following addition to the standards of brake gear for air braked cars be submitted to letter ballot, viz.: The lateral angle of the truck brake lever from the vertical be 40 degrees for passenger and freight cars.

Mr. WALL offered the following resolution with reference to air-braked cars, which was passed unanimously: That a committee be appointed to report at the next convention on the extent to which M. C. B. standards for air brake rigging on freight cars are being applied, and to make such recommendation as it may find desirable in order to extend the use of the standards, and to make such improvements in them as may be beneficial.

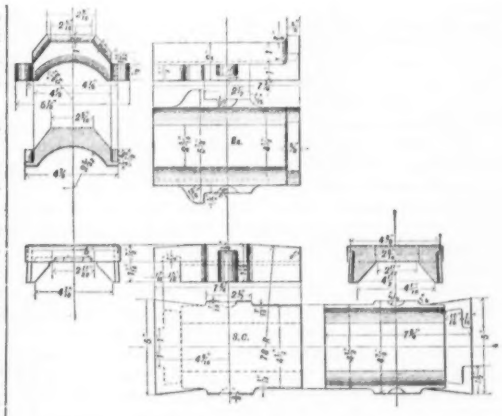
At this point Mr. C. A. Schroyer called attention to a disagreement in the two views of the location of the brake stem on freight cars. This was referred to the committee mentioned above for correction, with instructions to report at the next meeting of the executive committee

Mr. E. B. WALL moved: That the executive committee ascertain whether the M. C. B. type of couplers now being furnished by the various manufacturers conform to the standards of the Association, and that it submits a plan for the guidance of the Association in maintaining these standards. Also that the executive committee be empowered to issue such gauges, templets, or special instruction, prior to the next convention as it may find necessary for the proper maintainance of this standard.

Mr. E. D. NELSON offered a resolution which was adopted as follows: That the Master Car Builders' standard fitting for the coupling at the end of the train steam pipe on passenger equipment cars be a 2-in. female fitting with standard pipe threads.

Mr. G. W. RHODES submitted a resolution which was passed, as follows: In order that the members of the Association may come to the conventions better prepared to discuss and act on the recommendations of the committees, the secretary hereafter requests all committees to have their reports in by May 1, and that he be authorized to issue them to the members not later than June 1.

The ballot on the place for the next convention of the



Association resulted as follows: Cape May, 49 votes Montreal, 13 votes; Buffalo, 10 votes.

The committee on subjects reported the following for the next year:

Interchange of Freight Cars, with Especial Reference to Joint Inspection.

The Care of Air Brakes on Freight Cars and the Inspection of Same.

A committee recommended a vote of thanks to the following for courtesies:

The Baltimore & Ohio, the Chesapeake & Ohio, the Richmond & Danville and the Norfolk & Western railroads; also to the Old Dominion Co. and the Pullman Palace Car Co.

A vote of thanks was extended to the *Northwestern Railroader* for its enterprise in publishing a report of the sessions, and to the proprietors of the Hygeia Hotel.

The following officers were elected for the ensuing year:

President, John Kirby.
First Vice-President, E. W. Grieves.
Second Vice-President, T. A. Bissel.
Treasurer, G. W. Demarest.
Secretary, J. W. Cloud (appointed).
Executive Committee:

J. W. Marden,
J. N. Barr,
W. H. Day, } New members.

R. C. Blackall,
E. Chamberlain,
F. D. Casanave, } Holding over.

EXHIBITS.

In addition to the list of exhibits given last week, were the following:

National Machinery Co., Tiffin, O., a bolt cutter.

The Steel Truss Car Wheel Co., St. Louis, a full size wheel, very well finished.

Riggin Manufacturing Co., Wilmington, Del., a new combination cylinder cock for locomotives.

Grand Rapids Machinery Co., Grand Rapids, Mich., an improved universal trimmer for wood workers and car joiners.

W. S. Soule & Co., Boston, Mass., the Soule dust guard.

Smith Railroad Axle Grease Co., Baltimore, Md., samples of axle grease.

L. E. Waterman & Co., N. Y., samples of Ideal fountain pen.

Botsford Car Heating Co., Cleveland, O., section cork-lined hose and automatic coupler for car heating.

Ohio Varnish Co., Cleveland, O., samples of varnish.

Spang Steel & Iron Co., Pittsburgh, Pa., a sample of pressed steel, double flanged.

Beales Railway Brake Co., N. Y., model of equalized brake.

Crosby Steam Gage & Valve Co., Boston, a locomotive pop safety valve, chime whistle, etc.

Ashcroft Manufacturing Co., N. Y., an improved locomotive steam gage and the Tabor steam engine indicator.

Consolidated Safety Valve Co., Bridgeport, Conn., show Richardson's locomotive "Pop" safety valve.

H. W. Johns Mfg. Co., N. Y., samples of asbestos packing, vulcabeston, etc.

National Car Heating Co., Topeka, Kan., had a car equipped with the Searle system of car heating.

Williams Car Heating Co., Boston, an automatic regulator for steam heating.

Morton Car Heating Co., Baltimore, Md., had a car equipped with their new system of storage heat.

Fairbanks, Morse & Co., Chicago, a sample car wheel made from pressed steel; a hand car was also exhibited having these pressed steel wheels.

Leslie Bros.' Manufacturing Co., Paterson, N. J., a large display of photographs of the Rotary snow plow at work on the Union and the Southern Pacific Railroads.

Keegan & Halpin, New York, the Wells light in three different sizes.

The following firms were represented, but without exhibits:

Nathan Mfg. Co., N. Y.; Bigelow Varnish Co., Newark; Thermond Coupling Co., N. Y.; Rogers Locomotive Works, Paterson, N. J.; Cooke Locomotive Works, Paterson; Richmond Locomotive & Machine Works, Richmond, Va.; Pittsburgh Locomotive Works, Pittsburgh, Pa.; New York Locomotive Works, Rome, N. Y.; Schenectady Locomotive Works, Schenectady, N. Y.; Deckson Mfg. Co., Scranton, Pa.; Brooks Locomotive Works, Dunkirk, N. Y.; Ajax Metal Co., Phila.; Rhode Island Locomotive Works, Providence, R. I.; Pittsburgh Forge & Iron Co., Pittsburgh, Pa.; C. C. Jerome, Chicago; Cyclone Snow Plow Co., Minneapolis, Minn.; E. L. Reis, Baltimore, Md.; United States Metallic Packing, Phila., Pa.

Baldwin Locomotive Works, Philadelphia. Phœnix Railway Supply Co., New York. E. H. Andress & Co., New York.

A Standard Method of Testing Locomotive Engines.

BY F. W. DEAN.

THE GENERAL PLAN AND SCOPE.

There frequently appear appeals for accurate tests of locomotives. It is safe to say, however, that an accurate test of a locomotive will never be made unless the engine is jacked up and run as a stationary engine with friction brakes. By the words "accurate test" is meant a test made in the manner which characterizes tests of stationary boilers and engines. For all practical purposes tests of locomotives can be and are made with sufficient accuracy, but to this end the test should be conducted over a long enough time to practically eliminate the many errors which are likely to enter the results.

The greatest uncertainty lies in the water quantities, and therefore in all that depends upon them, such as the evaporative rates per pound of coal and per pound of combustible, and per ton mile. This uncertainty results from the swashing of the water in the tank and the impossibility of waiting at stations sufficiently long to allow it to become quiet; to variation in the level of the track, and to the change of level of the tender, which is due to the gradual diminution of the coal supply. It might be supposed that it would be practical to place a water meter on the running-board between the injector overflow and the boiler, but inquiry of a prominent maker of meters elicited the reply that there would be no hope of the results being more accurate by its use. If the trip is sufficiently short to render replenishing the water at intermediate stations unnecessary, then the tender can be placed upon the same track each day, and after the water is quiet the record can be taken. In this way considerable accuracy can be secured.

When the water is taken by a scoop from a trough between the rails the difficulty of obtaining reliable water quantities is greater. On the Pennsylvania Railroad a float in a tube some four inches in diameter is used, but probably not with satisfactory results. This tube is inserted in the nozzle of the tender while the engine is in motion, and the reading of a sliding scale attached to it is taken before and after replenishing the tender.

Another source of error in securing water quantities is the omission of the correction for the waste of the injector. There is quite a difference between different injectors in this respect, some wasting four times as much as others.

A serious and unavoidable source of error in fuel quantities is the necessity of beginning a new fire three or four hours before the train starts. If this is not done it is certain that the train will lose much time in consequence of a "green fire." In many cases it is necessary to start a new fire before each trip. It is therefore obvious that the stationary engine standard must be abandoned. If an old fire could be dumped a few minutes before train time, and a new one made, there would be no difficulty, but the "green fire" trouble will always prevent this. Now, when the fire is made several hours before train time, much coal is wasted by radiation of heat, and, perhaps, by blowing off. When burning anthracite coal, blowing off before starting is generally serious, often amounting to several thousand pounds of water.

A great source of error in locomotive tests is due to sentiment on the part of locomotive engineers, firemen, and all other persons connected directly with the working of the engines. It is one of the most difficult to remove, but no efforts should be spared to accomplish this result. If it is not removed a comparative test between different locomotives becomes a test of skill of manipulation of the engines instead of a test of the engines themselves. A person conducting a locomotive test should have an understanding with the higher officials that he is to have absolute control of the locomotive so long as he does not cause a loss of time on the trip, or impose conditions which make the engine inefficient. An interview with the master mechanic, engineer and fireman will generally make it clear what conditions can be imposed with impunity. Moreover, it is better to select a young man to operate the engine, as the old ones are more difficult to manage, since they are more likely to "know it all." The same man should run all engines in a competitive test, or else they should be run by a number of men in regular rotation.

The conditions to be observed should be clearly stated and understood before the test begins. Carrying out the conditions is at all times difficult, particularly if the engineer and firemen have never before run a test. They are, briefly, as follows:

The fire should be started at a fixed hour, which should be sufficiently early to insure a good fire by train time.

There should be no blowing off before starting and as little as possible at any time.

The train should be run strictly by schedule if possible, but if time is lost from any cause, it should be made up gradually over the whole division, instead of as quickly as possible.

The throttle should be wide open and the power graduated by the reverse lever.

The steam pressure should be kept as nearly constant as possible.

The water should be kept at a constant height, as nearly as possible, and after the completion of the trip pumped up to an assumed standard height. It is also very important to see that the water is at the standard height in the boiler just before starting, and at this time the height of the water in the tanks should be noted. If this is not attended to, the water which has been blown off before starting will be charged to hauling the train and counted in with that reported per indicated horse-power per hour, etc.

No water should be taken from the tank for any purpose except supplying the boiler, nor should the boiler be blown off during the test if it can be avoided. If this cannot be avoided, have the water at the standard height before blowing off and after.

The fire should be burned as low as possible, consistent with making schedule time, on approaching the terminal station, and immediately upon arriving at the roundhouse the fire should be dumped, or otherwise prepared for weighing, and the contents of the ash pan and smoke box weighed in a dry state. If the ashes must be wet, a sample should be weighed, dried and weighed again, in order to obtain a correction for moisture.

It is well to secure a graduated scale to the water glass of the boiler and take frequent readings of the height of the water. Such records may assist in explaining peculiarities in the water consumption on different trips. A graduated scale should be attached to the throttle rod, and frequent readings should be taken.

If nothing but an evaporative test is made, the above conditions should be observed, and also as many as possible of those specified in the rules for boiler tests drawn up by the American Society of Mechanical Engineers. (See Vol. VI. of their transactions.)

Calorimetric tests of the steam can with difficulty be made, but the Barrus calorimeter can be used on a locomotive.

If the power of the engine is to be measured, the action of the valve gear examined, or the coal and water used per indicated horse power per hour to be determined, the indicator must be used. This instrument should be attached to a three-way cock just at the outer edge of the steam chest, in order that the connecting pipes, which should be ¾ in. diameter, can go directly in a diagonal direction to holes tapped in the sides of the cylinder rather than into the heads. By this arrangement the pipes are shorter than when they pass over the steam chest into the cylinder heads, and have but very short horizontal portions, thus facilitating the rapid draining of the pipes It is better than having the three-way cock on a level with the centre line of the cylinder and connected with the ends of the cylinders with horizontal pipes, as the latter, practically speaking, hardly drain at all. Also on the score of safety for the operator and indicator the pipes should be connected to the sides of the cylinder in order to avoid serious results from blowing out a cylinder head.

It is important for the operator that his seat should be above the cylinder head and so arranged that the head or piston would pass out underneath without in any way disturbing him.

The indicator gear should be a true pantagraph motion with a rod reaching forward toward the indicator, and having a cord about 10 inches long. (See description in the *Railroad Gazette* of *Sept.* 20, 1889, and Feb. 28, 1890.) The advantages of this gear are its accuracy and rigidity. The indicator pipes should be heavily wrapped with a good non-conductor, and covered with canvas and painted. The indicator itself should also be wrapped up as high as possible. By taking these precautions the diagrams are much more satisfactory and correct.

The clearance volumes, by which is meant the volume between the piston when at the end of a stroke, and the the valve seat should be measured by placing wax around the piston at the end of the stroke, then replacing the lead, and pouring water into the port until it is level full. By opening the cylinder cocks it can be caught in a tub and weighed. To the amount so obtained there should be added the volume of the indicator pipe. The clearances can also be computed from the drawing of the cylinder. The clearance volume should be stated in cubic inches and in percentage of the volume swept through the piston during one stroke.

In order to determine the fall in pressure from the boiler to the steam chest, a steam gauge can be connected with the chest so as to face the operator, who should also be able to work a valve to shut off the steam or to throttle it, the latter being absolutely necessary in order to determine a reading. It is advisable not to open this valve until some time after the train starts, as, for some reason, the pressure on starting far exceeds the boiler pressure. The writer has seen it reach 280 lbs. when there were 140 lbs. in the boiler. It is still better to use a special indicator cock with a connection to the steam chest, and thus to make the indicator pencil draw the steam chest pressure line upon the cylinder diagram. Such cocks are very useful in indicating compound locomotives, and shortly will be a commercial article.

It is more correct to take diagrams at equal distances over the road than at equal intervals of time, because the former method gives a more correct average power. This is evident if we consider the case of diagrams taken every two minutes when going at a high rate of speed. In that time two miles may have been passed over, while in another case only one mile will have been made. In the former case, the time during which a certain power was being developed has no part in forming the average, in spite of the fact that twice as many revolutions were made as in the other case. In testing a stationary engine this difficulty does not occur because such engines generally make equal numbers of revolutions in equal intervals of time. With a locomotive it is very difficult to take diagrams at every mile post when running fast, but they should be taken as often as this especially on short runs. On a run of 100, 140, or 150 miles a diagram every two miles would answer. This is another difficulty in the way of making a locomotive test as accurate as that of a stationary engine.

If the diagrams are taken at every mile post, the signal should be given by the observer in the cab, who can easily watch the posts, but if they are taken at time intervals, the operator of one indicator can best keep the run of the time and signal to his companion and to the observer in the cab. At least this method has been the most comfortable in the writer's experience.

The counter should be so arranged as to be thrown into and out of gear when desired. A spring can be arranged to hold the arm of the counter in one position when not in use, and another spring can be arranged to pull in the opposite direction when desired. With the watch in one hand, at the instant the second hand passes a division, the last spring mentioned above can be pulled with the other hand, and released when the second hand passes another division. Absolute promptness is necessary in both operations. At very high speeds the interval of time may be as small as five seconds, and an error of one revolution means an error of twelve in the minute.

There are speed indicators which show the number of revolutions being made by a hand on a dial pointing constantly to numbers which can be read off and noted. They are extremely convenient, but hardly to be trusted.

In working up the diagrams it is best to use a planimeter with points on the back of the bar (as made by Elliott Bros., 101 St. Martin's lane, London) to facilitate the determination of the mean effective pressures, as by its use several hundred diagrams are quickly disposed of. It saves measuring the lengths of the diagrams and dividing the areas by the lengths and other work incidental to these operations. If any special work of investigation is to be done upon the diagrams it is important to select the best ones, as they most accurately represent the performance of the engine. A diagram which is free from evidence of stickiness of the indicator and the stretching of the cord, as shown by free, smooth flowing curves, is to be selected. The indicator pencil is often very loth to locate itself with precision. It sometimes refuses to come down from its highest position until the pressure is much reduced under the piston. The most extreme instance of this defect which the writer is familiar with is here shown, which is a diagram taken with one of the best modern indicators. Such a propensity of indicators often accounts for the sharp cut-offs and horizontal admission lines which are sometimes exhibited by persons who ought to know better

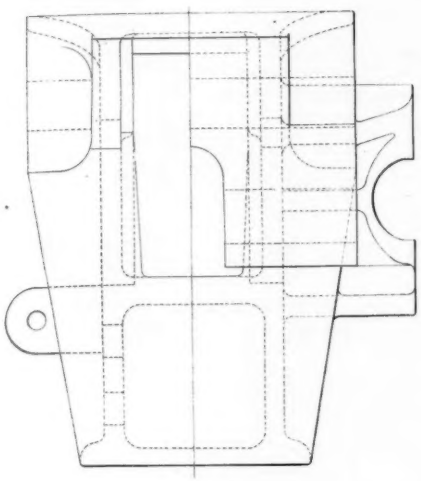


Fig. 3.

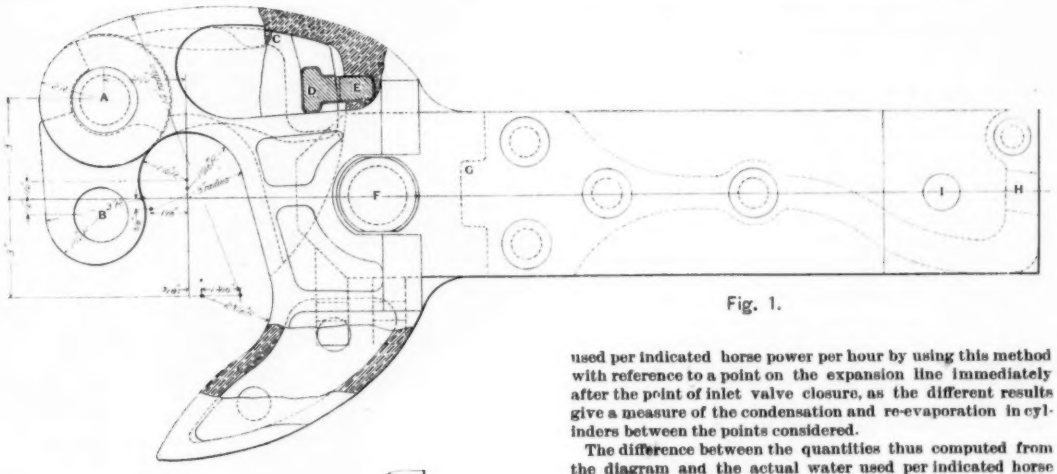


Fig. 1.

Fig. 5.

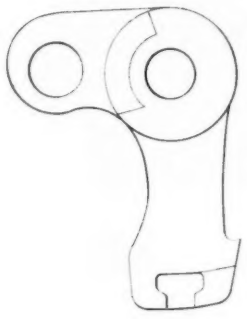


Fig. 4.

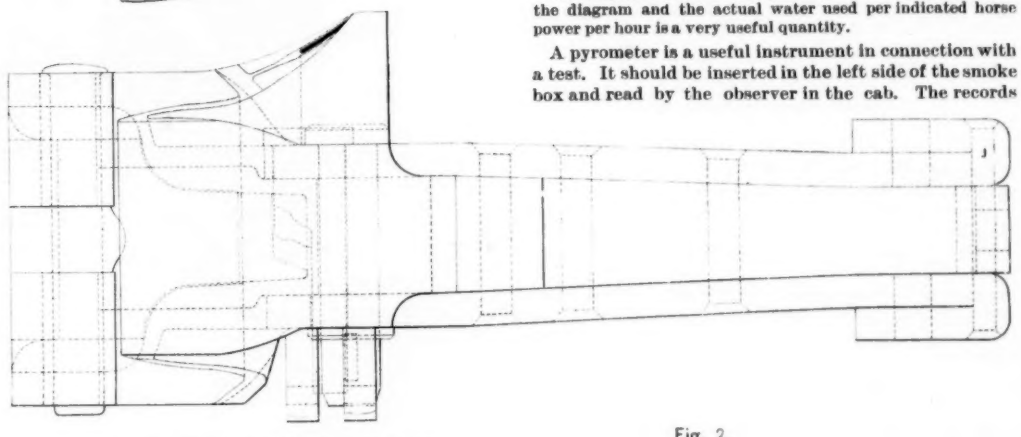
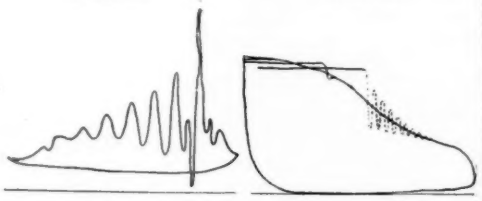


Fig. 2.

THE FOX AUTOMATIC COUPLER.

as evidence of superior performance of valve gears. It will be observed in general that an indicator piston locates itself best when the pencil arm is horizontal, and this suggests the advisability of using stiff springs. By very freely oiling the indicator piston and piston rod, and of course cleaning the instrument frequently, the cards are rendered more accurate.

100 *Spring.* 80 *Spring.*



From a Locomotive with Water in the Cylinder.

From a Locomotive with a Sticky Indicator; run over four times.

The diagram given by indicators should always be looked upon with suspicion. The writer has shown in the *Railroad Gazette* (Sept. 20, 1889) a diagram which was distorted beyond usefulness by the action of the wind upon the cord of a defective indicator gear. He has also known within his experience of an indicator spring suddenly becoming weak, and showing some thirty pounds more initial pressure in the cylinder than there was in the boiler. The fact that the indicator on the other cylinder gave no such pressure showed that the steam gauge was not at fault, to say nothing of the fact that the safety valve did not blow.

An indicator with a detent to the drum should be used for convenience, but this should not be detached so as to bring tension on the cord at high speeds, as it is almost certain to break the best cord. The cord should be held taut by one hand while the drum is released by the other, thus bringing the tension upon the cord gradually.

It will be found that if a new indicator is used upon a locomotive over a distance of some 200 miles the drum spindle will be so worn that the drum will incline sufficiently to prevent the pencil from marking throughout its movement. When this occurs, and perhaps before, it is best not to depend upon the stop to limit the pressure of the pencil, but instead to press the pencil to the paper by the free hand. The small handle for this purpose should be held lightly between the fore and middle fingers, and in a short time sufficient skill will be acquired to take the best of diagrams. In fact, the indicator should always be used in this way.

The indicator should be provided with a brass point, and metallic paper should be used. The brass point is durable and requires but the slightest pressure for clear marking upon metallic paper. Before train time the cards should be marked for the proper cylinder, numbered consecutively and placed in the breast pocket of the coat. When removed from the indicator they should be dropped through a slot in a somewhat large box.

A person using an indicator on a locomotive cannot make himself too comfortable, for at best it is a very fatiguing piece of work.

It is often desirable to compare the economical performance of different valve gears or of the same valve gears under different conditions, and therefore to determine the amount of steam used per indicated horse power per hour on the supposition that no condensation has occurred. This is to be determined from the diagram, and for this purpose the best diagrams should be selected. The writer has found the following original formulas most convenient for use, although persons who are not used to formulas will prefer to follow Porter on the Indicator page.

Formulas for determining the consumption of steam per indicated horse power per hour from an indicator diagram:

A = area of piston of engine in square inches.

S = length of stroke of piston in feet.

S_1 = distance, including clearance, from the admission end of diagram to a point of the expansion curve just before the opening of the exhaust, in inches of actual stroke.

S_2 = distance, including clearance, from same end of diagram to a point of the compression line, just after the closure of the exhaust, in inches of actual stroke.

r = number of revolutions per minute.

$M.\ E.\ P.$ = mean effective pressure in cylinder.

W_1 = weight of a cubic foot of steam at terminal pressure.

W_2 = weight of a cubic foot of steam at pressure found at point selected on compression line.

Therefore the indicated horse power is

$$I.\ H.\ P. = \frac{A \times M.\ E.\ P. \times 2\,S \times r}{33{,}000}$$

Weight of steam per minute is:

$$\frac{A \times S_1 \times 2\,r}{1728} \times W_1 - \frac{A \times S_2 \times 2\,r}{1728} \times W_2$$

$$= \frac{A \times 2\,r}{1728}\,(S_1\ W_1 - S_2\ W_2)$$

∴ weight of steam per one I. H. P. per hour is:

$$\frac{\frac{A \times 2\,r\,(S_1\ W_1 - S_2\ W_2)}{1728}}{\frac{A \times M.\ E.\ P. \times 2\,S \times r}{33{,}000}} \times 60$$

$$= \frac{(S_1\ W_1 - S_2\ W_2) \times 33{,}000 \times 60}{M.\ E.\ P. \times S \times 1728}$$

$$= \frac{S_1\ W_1 - S_2\ W_2}{S \times M.\ E.\ P.} \times 1145.833 \qquad (1)$$

which is the formula for use the two points marked on the expansion and compression curves are not on the same level. If they are on the same level, which can generally be the case, the formula is simpler, for then

$$W_1 = W_2$$

and formula (1) becomes

$$\frac{W_1\ (S_1 - S_2)}{S \times M.\ E.\ P.} \times 1145.833 \qquad (2)$$

which gives at once the number of pounds of dry steam used per indicated horse power per hour. As the value of $S_1 - S_2$ is the same whether the clearance is included or not, it is evident that the clearance can be ignored if formula (2) is used, and thus the computation is still simpler.

It is often instructive to determine the amount of steam used per indicated horse power per hour by using this method with reference to a point on the expansion line immediately after the point of inlet valve closure, as the different results give a measure of the condensation and re-evaporation in cylinders between the points considered.

The difference between the quantities thus computed from the diagram and the actual water used per indicated horse power per hour is a very useful quantity.

A pyrometer is a useful instrument in connection with a test. It should be inserted in the left side of the smoke box and read by the observer in the cab. The records show with some degree of accuracy the temperature in the smoke box, and give an idea of the degree of perfection with which the boiler absorbs the heat generated by the combustion of the fuel. The readings should be taken whenever there is a considerable change or whenever any important condition changes.

The vacuum in the smoke box can be approximately determined by the reading of a vacuum gauge connected therewith.

[TO BE CONTINUED.]

The Fox Automatic Vertical Plane Car Coupler.

This coupler is to be put on the entire equipment of the Southern Pacific Railroad, and has been adapted to interchange with the Miller, the Cowell, the link-and-pin and all types of M. C. B. standard coupler. It is made on the standard contour lines, as the dimensions indicate.

In interchanging with the Miller and Cowell couplers a special head is provided which can be quickly put on. This head is held to the Miller shank by a pin 1⅝ in. in diameter, and is kept from rotating by a lug on that shank which enters a slot in the head. A Miller end for the same shank is also held in by a pin and key.

For interchange with the link-and-pin another head has been devised. This head is inserted into any of the link-and-pin heads that arrive on the road, and the car goes on without delay, and with what is in effect a M. C. B. standard coupler.

This coupler when made for new cars or for substitution in the place of old couplers on cars already built is constructed as shown in figs. 1, 2 and 3. It consists of a wrought-iron or steel shank, with a malleable iron distance piece, as shown in fig. 2. It is also proposed to make this distance piece of cast steel. The steel or iron shank plates are turned over on the end, as shown at *J*, and riveted securely to the distance piece. The end of the shank is arranged for either the strap or the tail bolt, as shown at *H* and *I*. It is believed that a shank of this sort will be practically indestructible by blows or pulling stresses.

To the shank, as above described, is attached the coupler head (either of cast steel or malleable iron as desired) by means of a steel bolt 1¼ in. in diameter. To prevent the head from rotating, and to further secure it, the steel shank plates are allowed to pass forward into the coupler head as shown. Also there is a projection on the shank distance piece which enters the coupler head. It is claimed that if the head gets loose on the shank it will do no harm, but only assist in rendering the device easier to couple in difficult places.

The knuckle is pivoted at *A*, fig. 1, on a 1½-in. steel pin and is locked at *D* and *E*. This lock consists of a T-section key dropping vertically into a T-section slot in the end of the shank of the knuckle. As the knuckle returns it lifts the locking pin, and when closed allows it to drop into the locked position. When the knuckle is in the locked position a lug thereon is behind a corresponding

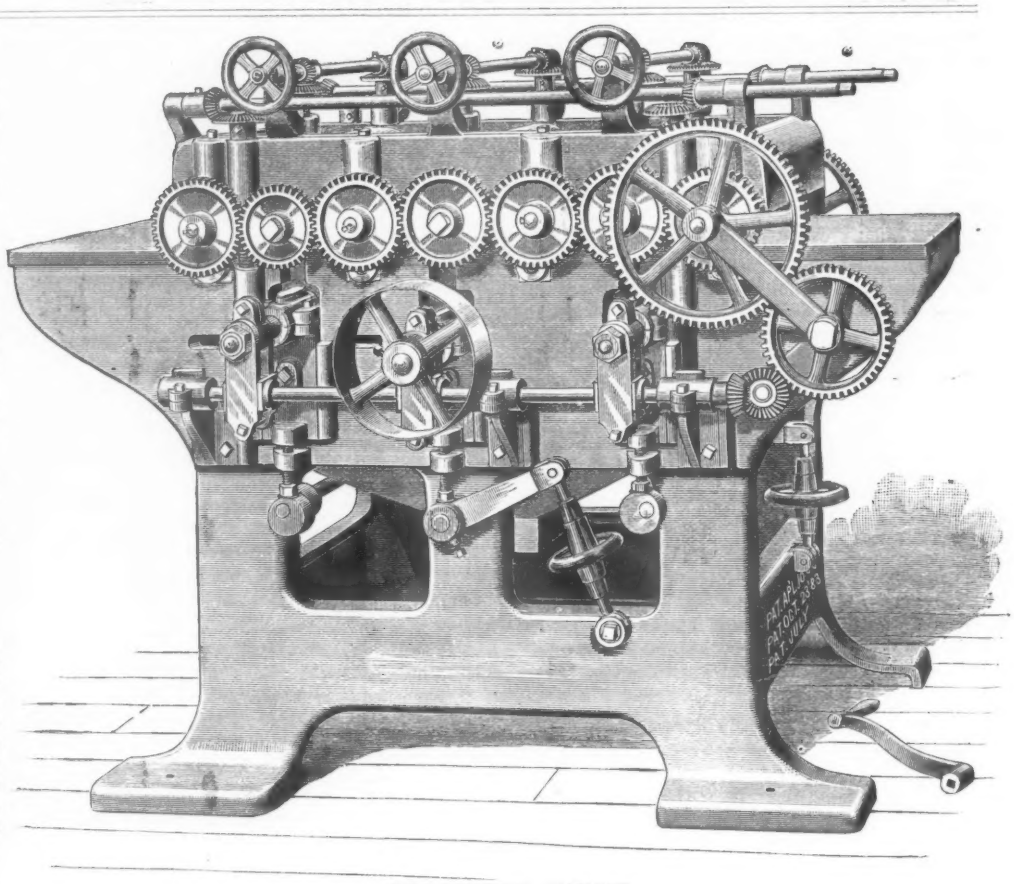
lug on the drawhead as shown at *C*, and upon these lugs a large portion of the stress is taken when pulling.

The knuckle has a fillet between the lugs and the shank, and the drawhead lugs have corresponding curves (see fig. 4). These fillets give to the knuckle a strong and shapely appearance, and no doubt add to its ultimate strength. Details of the knuckle and pin are shown in figs. 4 and 5, while fig. 3 shows clearly the fillet in the knuckle and the thickness of the walls of the head.

Many arguments are offered for the advantages of this type of coupler, particularly with reference to repairs. The head can be removed and a new one replaced in a few moments by removing the pin *F* without detaching the shank or draft spring. Thus one man can do the work of two. Also there is much less loss by scrap, and the head being of simple form can be easily cast in steel at a low cost, which gives to the head a strength impossible with malleable iron. It is also proposed to have at one end of the line a lot of the heads suitable for link-and-pin couplers; and to put these in place as soon as foreign cars come on the road, thus having nothing but M. C. B. standard couplers in all trains. At the opposite terminal the M. C. B. head will be taken off, as the foreign car goes to another road, and put on again when it makes the return journey.

Sand-Papering Machine.

The Egan Co., of 202-222 West Front street, Cincinnati have designed a new "Triple-drum Sander." Each drum has the new sand-paper fastener which is quick of adjustment and allows the whole paper surface to be used. The last drum has also the brush attachment which thoroughly cleans the work before it passes through the rolls. A positive feed is secured by eight steel feed-rolls, and all the upper pressure feed-rolls are so adjusted that short boards can be polished to advantage, and each piece be fed through the machine independent of the other.

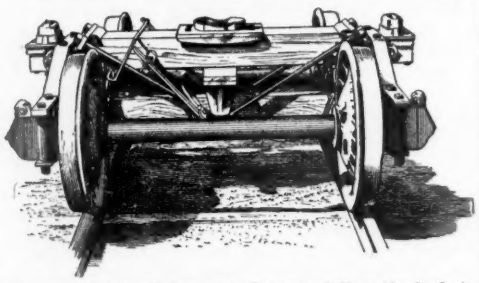


SAND-PAPERING MACHINE.

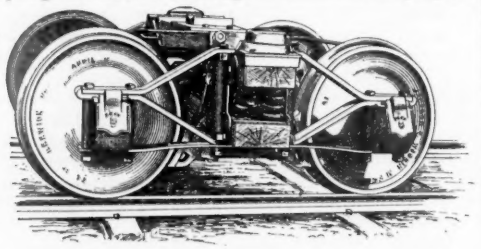
Made by THE EGAN COMPANY, *Cincinnati, O.*

Flexible Side-Bearings.

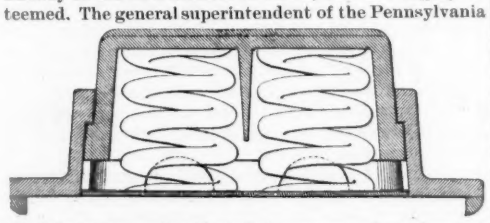
Mr. S. D. King, of Pittston, Pa., has designed a yielding side-bearing for freight cars, which consists of a three-piece malleable iron case containing two coiled springs, placed as shown in the engravings. To secure easy running of cars around curves there must be freedom or clearance between the bearings and the car-body,



otherwise the truck has a tendency to follow the body in the direction of a tangent to the curve, causing heavy draught and sharp flanges by hugging the outer rail. The springs are made stiff enough to resist the swaying mo-



tion of the car-body, and prevent its pinching on the truck without lifting it suddenly. These bearings are already in use on a number of roads, and are highly esteemed. The general superintendent of the Pennsylvania



Coal Company writes that that company has about 800 cars equipped with them, and they save a considerable sum in traction and in the wear of wheels and rails. They are manufactured by the Vose & Cliff Manufacturing Co., 115 Broadway, New York.

The Boyden Brake.

The Boyden Air Brake Co., of Baltimore, Md., had the most extensive exhibit at the Old Point Convention. It was located in a large tent at the rear of the hotel, and consisted of eight complete sets of Boyden brakes and one complete set of Westinghouse. Connected with this apparatus were both a Westinghouse and a Boyden engineer's valve. A Boyden air pump driven by steam from a stationary boiler of the hotel furnished the air for actuating the apparatus. Also the driver brake was shown in full size and in a model, both in working order. Sectional valves, triple valves and other parts were on exhibition, and an expert was present to explain the details of operation and manipulation.

In order to show the relative action and interchangeability of the Westinghouse and the Boyden brake these devices were arranged to operate independently. The regular exhibit being to show, first the regular Westinghouse devices in perfect condition by actuating them independently of the others, then to show that the Boyden brake operated exactly in this same way in service and emergency stops.

A careful examination of this exhibit showed that the Westinghouse devices were in perfect condition, the action of the triple valve being particularly satisfactory. In a series of service stops it was shown that the amount of air admitted to the brakes cylinder, as shown by gauges attached thereto, was the same with a Boyden as with the Westinghouse apparatus. In a series of emergency stops the rapidity of action was identical as far as could be seen with this number of brakes.

It has been the aim of the Boyden Company to produce a system which would interchange with the Westinghouse in all particulars. In this exhibit the couplings between cars are identical with the Westinghouse. The Boyden triple valve can be bolted upon and take the place of the Westinghouse triple and go into the place where the Westinghouse triple is taken off by the use of a blank flange; likewise the Westinghouse triple can be used upon the Boyden brake cylinder. The engineer's valve is so arranged as to actuate in a series of graduations a Westinghouse quick acting triple located at a distance of one car length from the engineer's valve. This is exhibited as a measure of its delicacy and of its interchangeability with the Westinghouse engineer's valve. Invariably the Boyden applies first in service stops and releases a little quicker, principally because the exhaust port is made larger. There is also noticeable a difference in the time required to charge the brakes in the two systems. The feeding-in ports are not of the same size, the Westinghouse being smaller.

It is claimed for this brake that it is interchangeable in every feature with the Westinghouse, both as to general dimensions of parts and action in service. The minor differences in action are largely dependent upon the sizes of passages and ports. The actual value of these differences can hardly be determined except by experiment with trains of considerable length.

Block Signaling in America.

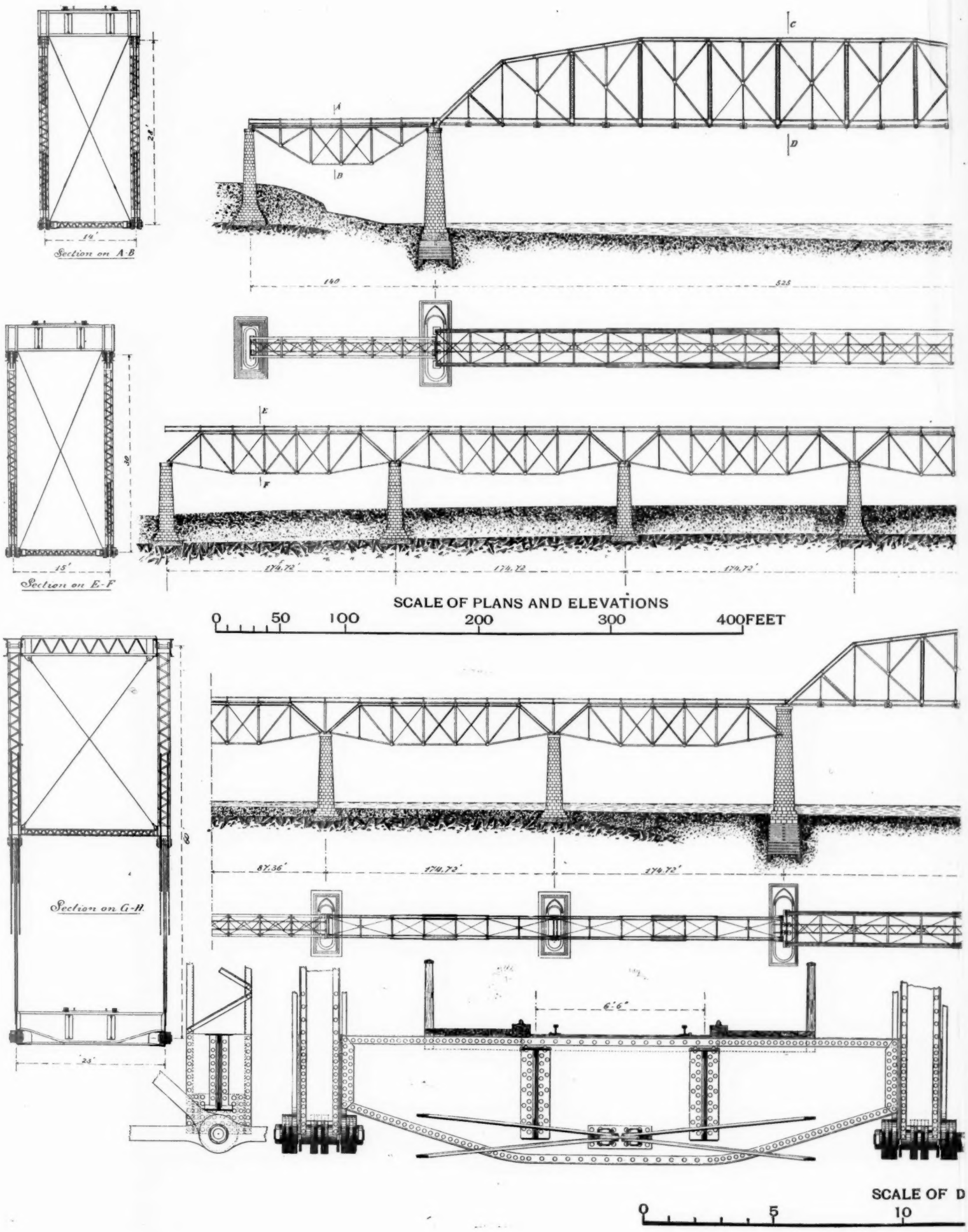
The ninth annual meeting of the Railroad Telegraph Superintendents' Association was held at Niagara Falls, N. Y., on Wednesday and Thursday of this week. About 30 members were present. The morning session of Wednesday was devoted to routine business. George T. Williams, of Cleveland, was elected President, G. M. Dugan, of Jackson, Tenn., Vice-President, and P. W. Drew, of Chicago, Secretary and Treasurer. In the afternoon the members made the tour of the Falls on both sides. At the evening session Mr. Robert Stewart read the paper printed below, and Charles Selden, of the Baltimore & Ohio, read a paper on the increase of tractive adhesion by the passage of electricity from wheel to rail, a subject upon which there is much dispute among both electrical and railroad men. Mr. Selden was of the opinion that there was decided merit in the method, and based his statements upon the performance of a small model which he exhibited. Among other subjects brought up were electric lighting in railroad service, by M. B. Leonard, of Richmond, Va., and "Lighting at Wrecks," by W. L. Taylor, of Altoona. On Friday an excursion will be taken across the lake to Toronto.

One of the most interesting features of the meeting was an address by Mr. Robert Stewart, Superintendent of Telegraph, Central of New Jersey, giving a sketch of the origin and growth of block signaling in this country. We give herewith extended extracts from this address.

. . . After many accidents had occurred, because of the largely increased demand upon the railroad facilities of the country, by reason of trains being run without other precaution against rear-end collisions than the vigilance and constant watchfulness of engineers, it was found to be essential to the profitable and successful operation of railroads that some plan should be devised by which the safety of travel might be made to depend upon something more than the caution of a single man. . . . During the war I held the position of Superintendent of Telegraph and Train Dispatcher on the Camden & Amboy Railroad, which extended from Camden to Amboy, N. J., and from Kensington (Philadelphia), Pa., to New Brunswick, N. J., with a short branch connecting the two systems between Trenton and Bordentown. Over these roads nearly all the Eastern troops passed in going to and returning from the war. One night in the summer or fall of 1863 the 12 o'clock midnight train from Kensington (at that time the starting point of all New York trains from Philadelphia), filled with soldiers returning to their homes and to Eastern hospitals, was delayed by a hot journal at Bristol. Later the 2:40 a. m. Washington express from Richmond Junction (about 1½ miles east of Kensington) followed the Philadelphia train. The engineer of this train, knowing that the Kensington train had left nearly on time, and having no warning of its detention, ran into the rear end of it on a sharp curve near Bristol, killing a large number of soldiers, as well as the fireman of the Washington train, who was on the front of the engine oiling the valves.

After this accident, Mr. Ashbel Welch, then President of the Camden & Amboy, sent for me and described a block system, which was in use on some of the English roads, giving me instructions to experiment, and endeavor to put in use a system by which trains could be notified (without being stopped) that the track to the next point was clear. After some experimenting, I had, within a short period, a system in operation between Trenton and Kensington, using the telegraph offices in the stations. There were seven block stations in the 25 miles of road. This was (as I believe) the first block system introduced in the United States.

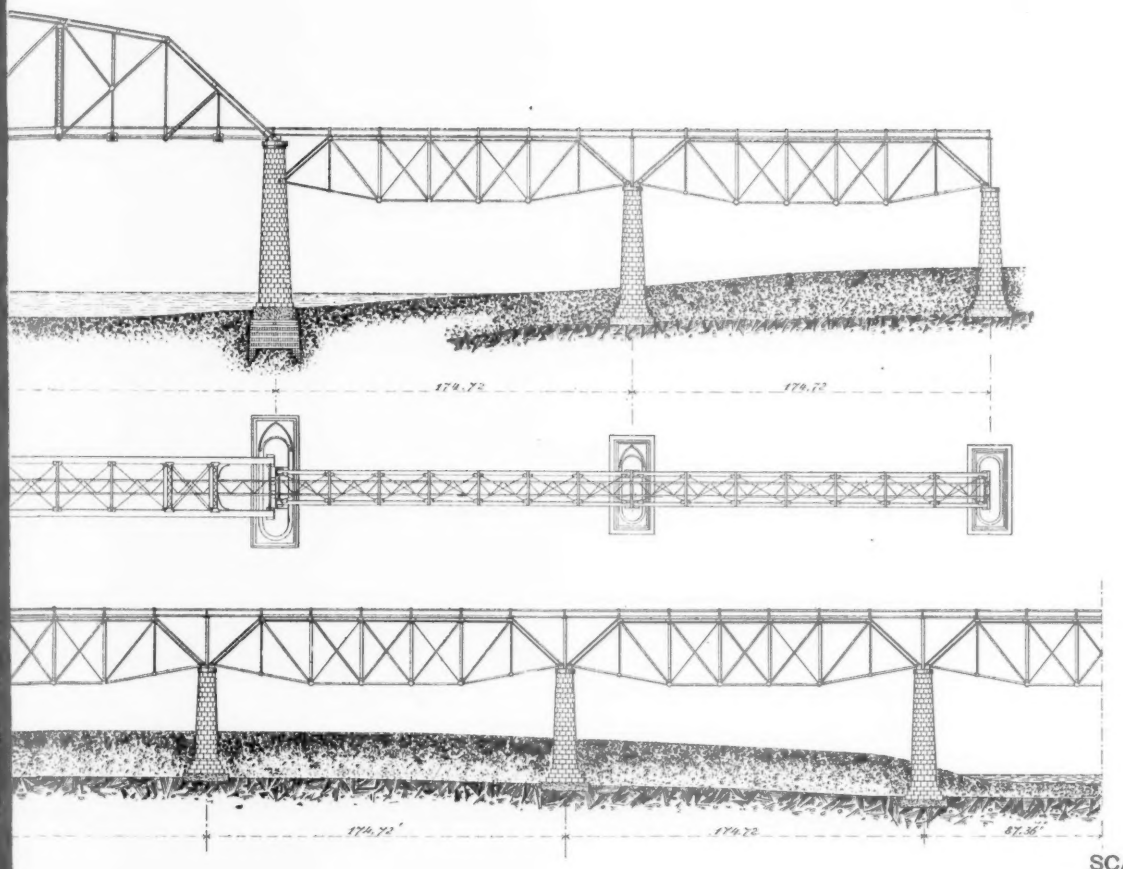
We used a banner signal, with two fixed glasses, the upper white and the lower red; also two independent lamps, one for eastbound and one for westbound trains, which were raised or lowered by a rope attachment, operated by hand, to give the desired signal. This was subsequently changed because the lights were frequently extinguished by a too rapid movement of the lamp. Furthermore, during the day, the signals were very indistinct, at times not being distinguishable until the

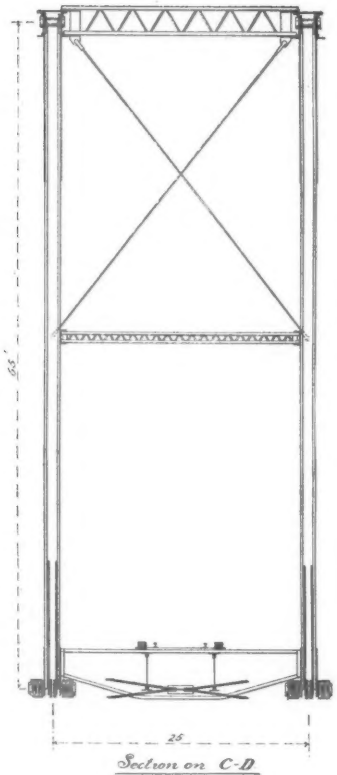


OHIO RIVER BRIDGE OF THE OHIO CO

SUPERSTRUCTURE DESIGNED AND BUI

MAX J. BECKER, *Chief Engineer, Ohio Connecting Railway.*

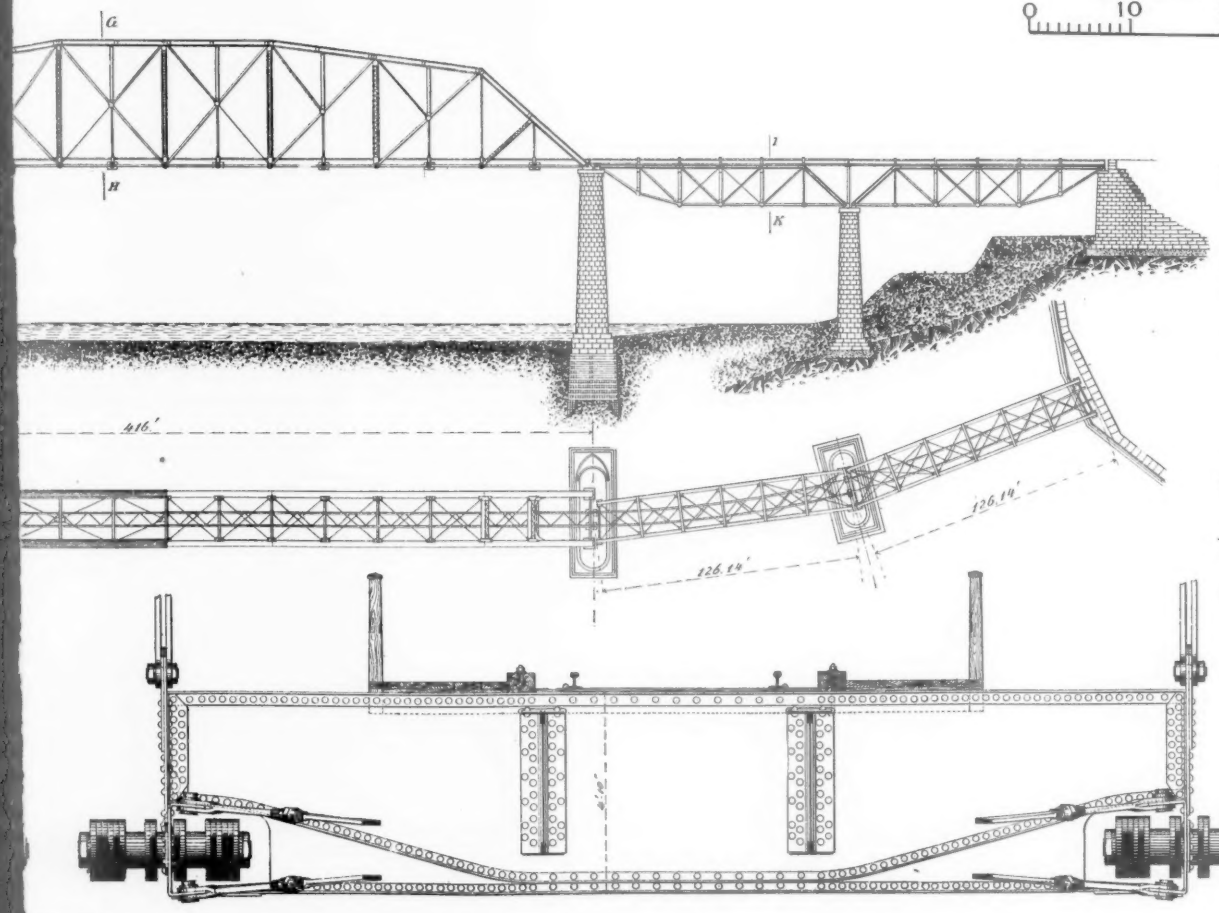




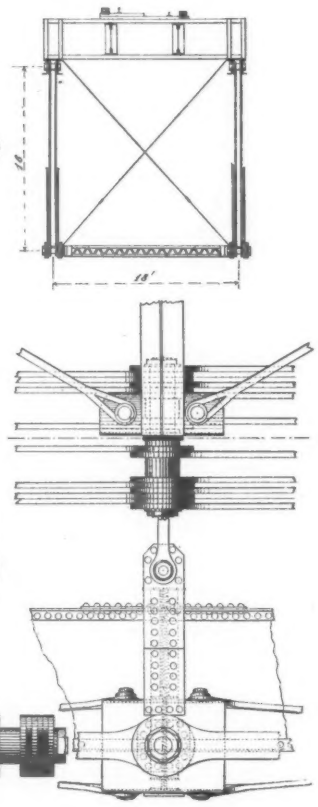
Section on C-D

SCALE OF CROSS SECTIONS

0 10 20 30 40 FEET



Section on I-K



ETAILS

15 20 25 FEET

NECTING RAILWAY, AT PITTSBURGH, PA.

LT BY THE KEYSTONE BRIDGE COMPANY.

C. L. STROBEL, *Chief Engineer Keystone Bridge Company.*

train was very close to them. A single stationary lamp with a movable red glass shield was next used. The glass, however, was continually breaking and red flannel was substituted in its stead. This overcame the difficulties to a great extent, but not entirely. At a few important stations we erected "hoods" to prevent the rays of the sun casting a reflection from the glass.

Since that time various improvements have been made over the original device, such as attaching to the box discs, diamonds or arms, which were only visible to the engineer while the signal was at danger. Neither the original device nor the early improvements were ever patented, probably because of the natural modesty of telegraph inventors at that time. A record of the trains was kept on a board, punctured with holes, by inserting a pin in the hole representing the section which the train had entered; and upon word being received from the next station that the train had passed the pin was withdrawn. The operators used the regular Morse instruments, and called up the next station in the direction in which the train was moving, saying that a train was "in," meaning that such train was in the block; and at the same time called up the station in the direction from which the train had come, saying "out," meaning that the train had passed and that the block was clear. This experiment proved so successful that it was extended from Trenton to New Brunswick, covering 26 additional miles of road. All this was completed and put in operation some time during the year 1864.

Shortly after the completion of this block system, the New Jersey Transportation Co., which controlled the road from New Brunswick to Jersey City, was consolidated with the old Camden & Amboy, under the title of United Railroads of New Jersey, and the block system was extended 30 miles further to Jersey City, making a complete block system from Kensington to Jersey City, except through the cities of Newark and Jersey City. In 1870, the connecting road (8 miles in length) between Frankford Junction (4 miles east of Kensington) and Mantua was completed and the block system extended to the latter point, making a total mileage covered by it of about 90 miles.

Shortly after the completion of this connecting road the lines of the United Railroads of New Jersey were leased to the Pennsylvania. From the time this system was established up to the time the road passed into the hands of the Pennsylvania, no rear-end collisions of any kind occurred; and I attribute this good record to the fact that only the positive block was in use, no permissive blocking being allowed. After the Pennsylvania took charge of these lines, a "green," or cautionary signal, as a permissive block was added. Very little, if anything, in the way of improving or extending the system was done from this time until 1873, when the Pennsylvania began its introduction, to a limited extent, on the Pittsburgh division. Its extension was very slow until the fall and winter of 1875-6, when it was rapidly extended over the entire main line of that road. The management was impelled to this rapid introduction by the prospective enormous passenger traffic to and from the Centennial Exhibition at Philadelphia. Had not the trains during this period been afforded the protection of the block system, the result can only be conjectured; but with the protection thus given, the immense traffic of that season was conducted, so far as I can recall, without a single accident due to the improper or inefficient operation of the system.

When the block system was first introduced, the distance between towers was quite long; on the main line, the distance varied from six to 10 miles. The form of signal first used on the Pennsylvania was a disc or banner. This has now been almost entirely replaced by the standard semaphore, the latter being almost a necessity where any form of interlocking is required. The Pennsylvania has now a continuous block system extending from Jersey City to Pittsburgh and from Philadelphia to Washington, the most extensive in this country. It is also used on the Northern Central. In cities and towns the block stations are in some cases only 1,000 ft. apart.

Mr. Stewart then described at length the automatic pneumatic system, the Hall wire-circuit system, the Sykes' system of locks for block signals operated manually, Black's mechanical block system, used on the New York elevated roads; the automatic clock work system as used on various roads in New England, and the arrangement of short circuits and special sounders used for single-track blocking on the Chicago, Milwaukee & St. Paul. He also referred to the systems in use on the Canadian Pacific, the Lake Shore & Michigan Southern, the Wabash, and the special arrangement of train dispatchers' signals used on the Louisville bridge. As all of these have been very recently referred to in the *Railroad Gazette*, we omit that portion of the address. It appears from Mr. Stewart's statement that a code of bell taps for communicating between stations more quickly than can be done by the Morse telegraph is in use at some places on the Pennsylvania. The instruments are made by Rousseau. The block sections on the Central of New Jersey, where the pneumatic track circuit system is working, are from 1,000 to 1,300 ft. long. Two cells of gravity battery are used for each track circuit. Mr. Stewart states that the battery is placed at the entrance of the block section. The rule on that road is for trains finding a signal at danger or out of order to proceed cautiously after waiting one minute. The system used on the Louisville bridge was described in the *Railroad Gazette* of Feb. 19, 1886, page 127. Mr. Stewart continued:

The Missouri Pacific put in use in 1882 the automatic electric block signals of the Union Switch & Signal Co. at several tunnels. The Chesapeake & Ohio has a regular block system covering all tunnels and trains going down both sides of the Allegheny Mountains. The Hudson semaphore is used. The Chicago, Burlington & Quincy has practically three different systems in use, all non-automatic, the difference being largely in the manner of communication between offices. Through the Chicago yard to a point 12 miles out communication is had by a bell code; and from that point to Aurora, 38 miles from Chicago, the block operators communicate by telegraph over wires exclusively devoted to that purpose. West of Aurora, the communication is between regular station operators on the train wires. The main line from Chicago to Pacific Junction, 482 miles, is now worked practically under what might be termed a "permissive" block. Each post is provided with two signals; the upper arm, the "absolute" block, also serves as a train order signal, and when at "danger" is used to space trains five minutes apart; the lower arm, the "permissive" signal, is practically an indicator, and informs the engineer, when at "caution," that a train has left the station not more than ten minutes prior. The engineer is then under orders to control his train with the expectation of finding the train at the next station.

The Wabash has been operating a block system for a year between Union Depot, St. Louis and St. Peter's, Mo., a distance of 32 miles, with 11 block sections, varying in length from one to five miles, using the Harrington double semaphore signal. The road is double track, crooked and hilly, and is operated as follows: The normal position of the signal is at danger. There is an operator on duty at each station at all times, who is governed wholly by the train dispatcher's orders. The operator reports each train that comes in sight, and is answered "clear," provided there are no other trains in that block. On receiving the word "clear" from the dispatcher, he pulls the signal and holds it until the train has passed, when it is again set at danger, and he immediately reports the train to the dispatcher. If the block ahead should be clear, the dispatcher would not wait for the operator to report that the train was coming, but would call and tell him "clear for No. 1," or whatever the number of the train might be. The time card rights of trains are in nowise affected by this block, and they receive regular train orders from the dispatcher in regard to meeting each other precisely the same as upon other parts of the line. This road blocks following trains apart between Decatur and Bement (20 miles) in the same manner, and does the same on other portions of the road in bad weather, using the regular train order signal. The New York, Lake Erie & Western uses a block system on the Northern of New Jersey, 28 miles, also on the main line between Jersey City and Lackawaxen, 110 miles, the Newark branch, between Jersey City and Paterson, 18 miles, and upon the main line between Waverly and Hornellsville, 76 miles, making a total of 232 miles. The Sykes system is used between Jersey City and Turner's, 47 miles; but that portion of it known as the track circuit has been discontinued.

The Philadelphia, Wilmington & Baltimore put into operation in 1880 an absolute block, using the old banner box. In 1882 the Pennsylvania leased that road, and immediately after the system was extended from Baltimore to Washington. The banner signals on this division have been entirely replaced by semaphores. Since the introduction of the block system only two rear-end collisions have occurred on this division; these were of freight trains, and in both cases non-observance of the rules was the cause. During several Presidential inaugurations passenger trains have been run in 13 and 15 sections, and trains were running simultaneously in nearly every block between Philadelphia and Washington.

The Philadelphia & Reading does not make use of any block signals, although it is the intention to arrange a system of blocks between the stations on the Philadelphia & Atlantic City Division when the double track is completed. On their main line they have in use a system in connection with what is called "train-ahead slips." At certain designated stations the engineer of a train is furnished with a slip showing the time at which the four preceding trains left that station, and where they propose to make stops. When the slip is given to a passenger train the operator notes thereon whether the last train passing is cleared into the next lay off siding, or if it is not cleared it is so noted, and the train is given a "look-out" order. They find this system to work admirably, as it keeps the trainmen fully posted as to the movements of trains ahead, which is a very important matter where there are so many coal trains.

Mr. Stewart in closing predicted that American railroad managers would ere long be compelled to recognize the necessity of using the absolute block system, for passenger trains at least; and said: The block system has been gradually increased in comprehensiveness and simplicity, but each improvement opens up new possibilities for still further extension. If a simple and inexpensive automatic system could be devised for operation between the main block stations, a long step in advance would be taken, for then the distance between stations might be increased and the expense of the equipment of a road thereby decreased, while the auxiliary system, constantly under the eye of the operator in the station, would notify him of the condition of the line. "Permissive" signaling might then be used with absolute safety in the main stations, as the auxiliary would act as an absolute intermediate block. Viewed in the light of past experience in the progress and development of telegraphy, the wildest flight of fancy cannot foresee the future possibilities in the perfection of the block signal system. Within the past 20 years means have been discovered, by which a break in the Atlantic cables can be located with the greatest certainty, at comparatively little cost. Why, then, should we not look forward to a perfection in the system of train signaling, by which a succeeding train should be kept constantly advised of the exact position of the preceding one, and that at a cost which would make its universal introduction practicable? No richer field presents itself to the inventive genius of man, and no class of men are more fitted to enter upon its development than the practical railroad telegraphers here assembled.

The Master Mechanics' Association.

The twenty-third annual convention of the American Railway Master Mechanics' Association began at Old Point Comfort, Va., at 9 a. m. on Tuesday last, President Briggs in the chair.

An address of welcome was delivered by M. E. Ingalls, President of the Chesapeake & Ohio Railroad, in which he offered the Association the freedom of that road from the Ohio River to the Atlantic Ocean. This address was oral, and contained much information of interest. Mr. Ingalls felt proud of the condition of the C. & O. to-day, and ventured to say that it was second to no other road in track equipment and *esprit de corps*. He referred to the rapid progress of Virginia since the war, the negro vote, and the repudiated debt, and expressed a belief that the future of the state was not less flattering than that of any other state in the Union. He also said, speaking as a representative of about $100,000,000 worth of property within the state lines, that he believed the problem of the negro vote would be soon settled by the "boomers." The influx of white population would make the negro vote relatively less important, and the demagogues would drop the negroes, and their vote would divide. This speech called forth much applause, and a vote of thanks was passed by the Association.

After this followed the President's address. Mr. Briggs spoke appropriately of Ericsson, and made a brief review of the progress of railroads and railroad mechanics.

The roll call was then made, 65 members answering to their names.

The Secretary's and Treasurer's reports were read and accepted.

Mr. J. H. Setchel, custodian of the Boston Fund, made a report which was accepted, and offered the following resolution which was passed.

Resolved, By the American Railway Master Mechanics' Association, in convention assembled, that a committee of three members, consisting of J. N. Lauder, John N. Barr and Angus Sinclair, be and are hereby appointed, empowered and directed to confer with the trustees or other proper officers of the Massachusetts School of Technology, of Boston; the Cornell University, of Ithaca, N. Y., and the Stevens Institute of Technology, and arrange and report a plan at our next annual meeting for the investment of the principal and interest of the Boston Fund of this Association in one or more scholarships in one or both of these institutions, and submit the same for the approval of the Association; the benefits of said scholarships to be for such time as may be directed by the Association as a prize to the sons of members who shall exhibit the most valuable attainments and skill in the development of locomotive mechanics.

Mr. Setchel also offered the following resolution which was adopted after considerable discussion. The vote upon it was almost unanimous.

Resolved, That the words "without nomination" be inserted in Art. 7 of the constitution after the words "shall be elected by ballot separately," and all other sections inconsistent therewith be and are hereby repealed.

In presenting this resolution Mr. Setchel stated it could not be supposed that he had any axe to grind, as he had held the highest honors of the Association for many years, and that it could be believed that he knew whereof he spoke when he made such recommendations. The idea was not a new one, but one that had been agitated for some time, and there was a desire on the part of the members to see officers elected who were the choice of the Association as a whole rather than the compromise of the nomination committee, each having his own friends. No majority choice could be made when the nominations were made by a committee, which was itself nominated by one man.

Questions for general discussion being in order, Mr. James Meehan proposed "The Method of Fitting Bolts." This was discussed by Messrs Noble, Meehan, Sprague, Pitkin, Small, Leeds, Ludkins, McCrum, and Swanston, at considerable length, the balance of opinion being strongly in favor of a taper fit for all bolts—bolts to be fitted to go into a solid gauge to a depth depending upon the service for which they were to be used. The smooth bolt was considered to fit better than a rough one, and a parallel one did not fit at all except on the point. The same was true of crank pins and axles. A good way to fit taper bolts was to try a solid plug gauge into the hole to be supplied with a bolt, and then to put the same into the female gauge, and make the bolt fit that gauge just as the plug did.

Mr. M. N. Forney proposed the following: "Is it safe to run a pony truck under fast express engines?"

This was discussed by Messrs. Forney, Roberts, McCrum, Setchel, McKenzie, Sprague, Finlay, Barr, Pitkin, and Barnes, the balance of opinion being in favor of the pony truck instead of the four-wheel for locomotives having six driving wheels. The discussion brought the fact that there was not a case on record as far as the members present were aware where a pony truck had been the cause of a derailment at high speed, and that when the swing links or lateral motion of the truck were correctly provided for there was no trouble on sharp turnouts. This subject being one that all felt an interest in, it was continued until the next day.

Mr. J. H. Setchel offered the following resolution, which was passed, and the following committee appointed by the chair to act thereon: Messrs. Orlando Stewart, Charles Graham, D. W. Stevens, David Clark and John McKenzie.

Resolved, That a committee of Conference be appointed by this Association, to act with a like committee from the Master Car-Builders' Association, to be instructed to vote for, and if possiole, secure, the passage of a resolution by the joint committee to fix the annual meeting of each Association at the same place each year; the Master Car-Builders to meet the second Wednesday in June, the Master Mechanics the Monday following. This committee to report at the twenty-fourth annual meeting.

The following names were proposed for associate membership:

W. H. Marshall, W. D. Crossman, Arthur T. Woods.

Mr. John Hicky then offered the following resolution:

A committee shall be appointed whose duty it shall be to investigate the question of standards of the Association, and to report on the good and bad features thereof, and to care for their maintainance, and to propose alterations in those previously adopted, if necessary, and to report on the policy of attaching drawings of standards to each annual report.

The report of the Committee on "Compound Locomotives" was then read by the chairman, Mr. Barnett, and the discussion continued until the following day.

The second session was begun with the discussion of the paper on compound locomotives. As that paper is

very long and admirably written, we shall leave it and the discussion to a future issue, when we can give it more space than would be possible this week.

It was voted that the constitution be changed so that one year's notice would have to be given prior to the election of associate members.

Notice was given by Mr. John Hickey of a proposed change in the constitution with reference to the admission of two members from each car building concern.

Mr. J. M. Foss was placed upon the list of honorary members.

The following committee was appointed to draw up resolutions of thanks: John A. Hill, W. A. Smith, A. W. Gibbs.

The Secretary stated that, owing to a misunderstanding, there will be no report on the subject of testing laboratories, chemical and mechanical, and called upon Mr. Geo. Gibbs, in the absence of the chairman, Mr. Philip Wallis, to make explanation.

Mr. GIBBS: There was a misunderstanding, and Mr. Wallis, the chairman, expected to be here to explain it. After consultation with the Secretary he decided not to make a report.

Here the Secretary made a motion that the subject be continued, and that a new committee be appointed to take care of it.

Mr. D. L. BARNES: As this matter now stands it reflects upon the committee; the facts of the case are that the committee was appointed in July, 1889, and the chairman did not call a meeting until about six weeks since; at that time circulars were prepared and sent to several railroads. At a second meeting about two weeks since the chairman stated that, while he had replies containing valuable information from several roads here and abroad, yet he did not feel justified in making a report owing to a letter he had received from the Secretary, which narrowed considerably the scope of the report; that is, from the general topic of "testing laboratories, chemical and mechanical," to the much narrower subject of the "usefulness of laboratories to railroads." The chairman showed me the letter from the Secretary, a quotation from which is in a letter to the Association, which the Secretary has in his possession and which the other members of the committee refused to sign. I would like to have the Secretary read this letter, as it will explain the delicate position in which we have been placed.

The motion to appoint a new committee to attend to this matter was lost by a unanimous vote. Mr. Pomeroy then moved that the subject be continued in the hands of the old committee. This motion was carried.

The paper on the "efficiency of the link as compared with other valve motions" was then read and passed without discussion.

The question postponed from the first session, viz., "Is it safe to run a two-wheel pony truck at high speed?" was then considered. Mr. John Campbell, of the Lehigh Valley, was called upon to give his experience.

Mr. CAMPBELL: I cannot recommend a pony truck for high speed. We have had no accidents. There is more side vibration with a pony than with a four-wheel truck.

Mr. PECK: In six years' experience with pony trucks I have had no accidents and would not be afraid to run them anywhere.

Mr. ROBERTS: It seems to me that the objections arise from prejudice. It is not easy to see why we should not use the mogul engine when there are no accidents on record against it, and it is much easier to arrange the link motion and guides and wheel motion. I think I am safe in saying that the wear on the wheels of a pony is no greater than on the wheels of a four-wheel truck.

Mr. ALBERT GRIGGS: I have used moguls for 19 years on a crooked road not having a mile and three-quarters of straight track at any one point, and without difficulty when the trucks were properly built; and in passenger service at 35 miles per hour. I agree with Mr. Roberts that there is no more wear per wheel on a two-wheel than on a four-wheel truck.

Mr. CROMWELL: We are using about 200 pony trucks on the Baltimore & Ohio and have had no trouble with them; however, we were compelled to put the flange tire on the front wheel of the consolidations in order to prevent that wheel from falling off the rail. We have had some experience with ten-wheel locomotives and that has led me to believe that they are safer. An examination of the flanges of a mogul drivers shows that the trucks do not do all of the guiding. There is little difference between the wear of the flanges of the wheels of two-wheel and four-wheel trucks. A slight difference in the diameter of the wheel causes the wheel to run to the right or to the left.

Mr. ROBERTS: The danger with moguls seems to be dependent upon the length of wheel base rather than on the truck.

Mr. SETCHEL: There must be more wear per wheel on a two-wheel than four-wheel truck.

Mr. J. N. BARR: I have had one experience with a ten-wheel engine. On arriving in Washington after a long run 28 in. of the flange was found to be missing from a front truck wheel of a ten-wheel engine; it was found 20 miles back on the track. Now, if this had been a pony truck, would there have been a greater liability of derailment? In another case 15 in. of a flange was found in a frog. This was an important train; it was stopped by telegraph 12 miles from where the flange was lost, the engineer not being aware of the accident. In five other cases on record where the flanges broke the engine was derailed. The experience with four-wheel and pony trucks is hardly comparative, because of the wide difference of the number of each in use. Probably all of us know of accidents with four-wheel trucks.

Mr. J. MCKENZIE: These were cast-iron wheels. I do not believe there is a mogul engine in the United States running with a chilled wheel; no one would dare to do it in passenger service. We have been led to the mogul type because of the limit of total weight. We take the extra weight from the four-wheel truck and put it in the boiler, and use the mogul type. We have no trouble with the cutting of the flanges of the drivers. We are not afraid to run our mogul engines at high speed, for the reason that we carefully watch the flanges, and do not allow them to become sharp.

Mr. M. N. FORNEY: While it is true in this country that but few pony trucks are used, yet the practice is almost universal abroad to use such trucks on high speed engines. If such trucks can be used abroad, why not here?

The report on the Advantages and Disadvantages of placing the Fire Box above the Frame was read by the Secretary. This report was received and the committee continued. No discussion.

The report of the Committee on Relative Value of Steel and Iron Axles was read.

Mr. Geo. Gibbs resigned from the Committee on Laboratories. After considerable further explanation by Mr. Gibbs as to the inaction of the chairman of the committee on testing laboratories a motion was made to reconsider the previous vote on the continuance of the committee and a motion was made that a new committee be appointed. This was carried against the objection of some of the members.

Richmond Locomotive Works.

By invitation of the Richmond Locomotive Works the members of the Master Mechanics' and Master Car Builders' Associations visited Richmond on Monday last. The party went by a special train on the Chesapeake & Ohio, and were accompanied by Mr. E. F. C. Davis, General Manager of the works, and Mr. William Garstang, Superintendent of Motive Power of the road. The visitors were met at the train by Mr. William R. Trigg, President of the works; Mr. A. H. Raynal, Superintendent; Mr. George Jones, Secretary; Maj. E. D. T. Myers, and other officials. As the visitors passed through the erecting shop the traveling crane picked up a boiler weighing over 30,000 lbs., belonging to one of the consolidation engines being built for the Richmond & Danville, and set it in place on the engine frame.

The parts of the engine and boiler of the battle-ship "Texas" attracted much attention. The flanging of some of the sheets and the furnaces for heating interested the master mechanics especially. The perfection of the large brass castings for the "Texas" was a subject of general comment. After luncheon, the party were driven in carriages to the principal points of interest in the city, including the Lee monument and the State House. At 5 o'clock the visitors returned to Old Point Comfort on the special train.

Locomotive building is a new department at these works, and it is only fair to state that some further additions to the machinery equipment will be made. They have turned out this year a very small number compared with the output of the older shops, but they are very much gratified and encouraged by the satisfaction with which their workmanship has been received by the officers of the roads for whom the machines were built. Just now they are building about 15 locomotives, chiefly of the consolidation and mogul types, for some southern roads. Among these are two 21 in. × 24 in. consolidations for the Chesapeake & Ohio, and ten 20 in. × 24 in. for the Richmond & Danville. Also under construction is a heavy mogul for the Richmond, Fredericksburg & Potomac, and a number of small locomotives for logging and street service.

In passing through the shops one will notice that they are already well equipped for locomotive building, with the necessary tools and facilities. The company does not doubt its ability to cope with any locomotive manufacturing concern in this country in the character of the work, but it is probable that the long experience of others has given them some advantage in the matter of deliveries.

The construction of the machinery for the battle ship "Texas" is now well under way. This of itself is a large undertaking. In the last year or so this firm added about $200,000 worth of new machinery of the best and most approved type. Among these tools may be mentioned the following: two large hydraulic riveters with hydraulic lifts above in the towers; several portable hydraulic riveters; large vertical bending rolls that will roll sheets up to 1¼ in. or more in thickness. These rolls are grooved, to prevent slipping on the sheet. There are two hydraulic flangers and several other large boiler-shop tools.

The boiler drawings are made full size on a large board painted black. The pattern shop is a three-story building, well arranged for the purpose, and the buildings are in a position convenient to each other.

Railroad Matters in India.

The Khojak Hill has at last been pierced, and it is hoped that the tunnel will be completed within a few months.

The government have given orders to reduce the rates for first and second class passengers on all State railroads, and it is supposed that all other lines will follow suit. The present rates are: first class, 1½ annas; second class, ¾ anna, per mile, and a reduction of one-third is to be made. This class of traffic does not pay at present rates, and unless the reduced rate encourages the better class of natives to travel first or second class, instead of third class, as at present, it will only make matters worse for the railroad companies.

The East Coast Railway is the only line of importance which is likely to be taken in hand next cold season, although if the "grand chord" of the E. I. R. is sanctioned by government, it will be started at once, and several branches or short extensions may be constructed in different parts of the country.

The boom in the metal market at home has caused the different consulting engineers to cancel all indents for metal ties, and large orders for wooden ties have been placed. The danger of relying entirely upon imported material has been pointed out more than once, but still more than 95 per cent. of the metal ties used are received from Europe, although we have plenty of good iron ore, cheap labor, and coal, and, in fact, every requisite for turning out any number of metal ties. All that is wanted is a little energy and a few enterprising men. Suppliers of wooden sleepers, who had looked upon their occupation as gone, are holding up their heads again, and have to be smoothed down carefully by those who are badly in want of ties; but they must not be too exacting, for creosoted fir ties from Europe can be had at a very moderate price.

The battle of the brakes still continues and none of the trains on our principal lines have as yet been fitted with either system, with the exception of two or three experimental trains. The recent accident at Carlisle has brought the subject again prominently forward, and many have pointed out that any brake which is liable to become useless in frosty weather will be of little use on the frontier railroad.

A new preventive of boiler incrustation has been discovered by an engine driver, viz., one pound of *jaggery* (coarse, unrefined sugar) to a thousand gallons of water. This is said to be effective, and it certainly is cheap.

The influenza is affecting all sections of the community. Several other educational institutions have been closed until the epidemic disappears. The large railroad workshops at Sennalpor, the government gun and ammunition factories, the post office, custom house, and even the police have had from one-tenth to one-fifth of the working staff on the sick list. There have been a good many fatal cases, but principally from the after effects, or pneumonia.

The Bengal Nagpur Railway will be opened about March, 1891, and the journey to Bombay from Calcutta will thus be shortened considerably. This will bring our mails from Europe in a shorter time; and now that the rate of postage is to be reduced to 2½d. per half ounce, we shall be better able to keep track of friends abroad, or at home. The Bengal Nagpur line will also open out vast forests of sal timber, and as this is the best timber in the country for cross-ties, other railroads will profit by the fall in the price of timber which must follow. The B. N. R. itself is laid entirely with steel, trough-shaped cross-ties.

The Delhi-Kalka Railway is progressing apace, and should be ready for opening by the time the annual exodus from Simla, in October next, takes place. A fast through service between the summer capital and the City of Palaces is to be organized, which will reduce the time now spent in journeying between these two places.

Economy has been for some time the order of the day, and the cry still continues; great reductions have been made upon many of the railroads, notably on the E. I. R., where the new Chief Engineer, Mr. F. E. Robertson, of Sukkur bridge renown, expects to reduce the expenditure by ten lacs of rupees, yearly, without in any way impairing the efficiency of the line. The E. I. R. have generally been very fortunate in their selection of officers, and in this case undeniably so, for Mr. Robertson has already reduced the clerical work by one-third at least. The bills for stationery and the office establishments on most Indian railroads are ridiculously large, but this has chiefly been brought about by the action of the government in calling for returns and statistics, which are of no real use, and which are in many cases pigeon-holed for years, and then sold as waste paper.

The 26-in., deep fish-plates with six 1-in. bolts are not giving entire satisfaction. First, the bolts when screwed tight prevent the rails from expanding, and the rails consequently buckle in the middle. Secondly, after being in use for a few years, they become worn near the rail ends, and as this increases there is almost as much knocking and clatter as with the old form of plate. In some cases two out of the six bolts have been removed in order to allow a free expansion and contraction. Very few nut locks, or lock nuts, are to be found on Indian railroads, and still we do not have much trouble with loose bolts. The keyman who patrols his 3 or 4 miles daily carries a hammer in the morning and a set of wrenches in the afternoon, and manages to kee

both keys and bolts fairly tight. Bayliss & Jones' Eureka lock nut and one or two of Ibbotsons Bros'. patents have been tried, but only on short sections.

CALCUTTA, April 20, 1889. RAILROADER.

TECHNICAL.

Manufacturing and Business.

The manufacture and sale of railroad heating and ventilating supplies, conducted by James Spear in his own name, has been transferred to the James Spear Stove & Heating Co., a stock company. Mr. Spear assumes the Presidency, and continues the management of the entire business. The company will make heaters and ventilators for cars and furnaces and stoves for stations, ticket offices, signal towers, etc.

The Shiffler Bridge Co., of Pittsburgh, has the contract for an iron building 360 × 150 ft. for a finishing mill for the Illinois Steel Co., at its South works, Chicago, where a number of extensive improvements are being made.

The Pittsburgh Reduction Co. has put in operation part of the addition recently made to its works. The weekly output of aluminum now amounts to 1,500 lbs.

Among the orders received by Riehle Bros., proprietors of the Philadelphia Scale and Testing Machine Works, are the following: One 200,000-lb. U. S. screw-power testing machine, Thomson-Houston Electric Co., Boston; one 5,000-lb. foundry tester, U. S. Rolling Stock Co., Chicago; one 200,000-lb. horizontal testing machine, Gould Steam Forge Co., Buffalo, N. Y.; one 20-ton wagon scale, Passaic Rolling Mills, Paterson, N. J.; one 15-ton self-adjusting railroad scale, Colwell Iron Works, Cateret, N. J.

Iron and Steel.

The Shenandoah Furnace Co., of Shenandoah, Va., will erect a rolling mill which will have a capacity of 600 tons finished iron per month. David A. Flickwir is President and Edward P. Botsford is Secretary and Treasurer of the Company.

The West Superior Iron & Steel Co. has let the contract for the construction of the iron building of the Bessemer department of the plant, together with all machinery, to the Pittsburgh Iron & Steel Engineering Co.

The Lodge & Davis Machine Tool Co., of Cincinnati, has sold to the Sioux City & Northern an entire machine shop outfit for the plant, to be located at Sioux City, Ia.

A new plant will be built by the Milwaukee Bridge & Iron Co., in Milwaukee, Wis. The main building will be 600 ft. long and 100 ft. wide. There will also be a second shop, 60 ft. wide and 180 ft. long, and several smaller buildings. The plant will cost $175,000, not including the machinery.

The Griffin Iron Foundry Co. has been organized, with C. H. Osborne President and R. H. Drake Secretary, to erect foundry and machine works at Griffin, Ga.

The Rail Market.

Steel Rails.—Eastern mills have sold about 10,000 tons and quotations are $31@$31.50. The Pittsburgh mills have secured 5,000 tons and quote $31.50@$32.50 cash, at mill. The quotations at Chicago are $35. The report of the Board of Control shows sales up to June 1 of 1,086,000 tons, and deliveries of 598,000 tons to the same date. This does not include the Allegheny Bessemer or the Colorado mills.

Old Rails.—The quotations at New York are $24.50@$25.75, and for foreign rails $24.50. The Pittsburgh quotations are $26.50@$27 for old iron rails, and at Chicago old iron rails are held at $25.25@$25.50, and old steel rails at $21@$21.50.

Interlocking.

The National Switch & Signal Co., of Easton, Pa., is putting in an interlocking plant for the Boston, Revere Beach & Lynn Railroad at East Boston.

Lackawanna Lubricators.

John G. Roberts, locomotive engineer on a Burlington & Missouri River fast express, writes a letter describing his regular run of 170 miles in four hours 35 minutes and return the same day, and speaks with great enthusiasm of the Lackawanna lubricating compound for keeping pins and driving boxes cool. "I would like to say that one filling of our ordinary oil-cups with this compound goes farther than three fillings with either tallow or oil, and the Lackawanna cup goes much farther that that even."

The Morton "Heat Storage" System of Car Heating.

This system was described in our issue of June 6, page 398. It was shown at the conventions of the Master Car Builders' and Master Mechanics' Associations, applied to a Shenandoah Valley car. Mr. Eugene Carrington, General Superintendent, and Mr. H. M. Montgomery, late of the New York & New England Railroad, who is now employed as Mechanical Engineer of the Morton Co., were present to explain the theory and operation of the system.

Change of Location on the Boston & Albany.

The Boston & Albany has just completed an important change in its location near the 13th M. P. in the town of Wellesley, Mass. Beginning at Rice's Crossing station, the new line, after curving gently to the right for 500 ft., runs on a perfect tangent to Wellesley Hills station nearly a mile further west. Formerly the road ran in a particularly tortuous manner over this section, dodging around a reverse curve through a heavy ledge cut, and affording an engine-driver very little chance to see what was ahead.

That it has long been regarded as a bad place is indicated by the number of different plans in the Engineering Department that have been considered for improving it. In the fall of 1887 two lines were run, each starting from about the same place near Wellesley Hills, but joining the old line at different points further east. After careful consideration the more northerly of these two was chosen, and early in the spring of 1888 work was begun. The new roadbed is nearly all in excavation, and, being made wide enough for four tracks, required about 100,000 cu. yds. of earth and over 16,000 cu. yds. of rock to be removed. The earth excavation was done with two steam shovels by the company, and nearly all the material was sold to parties in Cambridge and Boston for the filling of low lands and the building of streets.

The rock excavation was done by L. A. Taylor, of Worcester, the bulk of which was wasted at different points along the line, notably at Cottage Farm and Wellesley, a small amount, however, being sold for building purposes. Two new iron highway bridges are being built over this new line with first-class ashlar masonry abutments, R. F. Hawkins, of Springfield, being the contractor for the iron work, and L. A. Taylor, of Worcester, for the stonework. Sunday, June 1, 1890, both tracks having been laid as far as possible, connection was made with the old line at each end, and trains began running over their new course. A small amount of rock excavation yet remains to be made where the new line crosses the old, about midway of its length, the new tracks being swung temporarily to the north to allow of this being done. In another month the two highway bridges will be completed and the new tracks placed in their final position.

Roller Slide Valves.

Some wonderful results with the roller slide valve are reported by roads using it. Mr. J. McKenna, Superintendent Motive Power, Indianapolis, Decatur & Western, says that these valves run on an average 150,000 miles without repairs. What balanced valve can beat this?

Eccentric Straps.

Several Western master mechanics, realizing that the frequent breaking of eccentric straps is due principally to their faulty design and want of surface, are abandoning their narrow sheaves and straps, and replacing them with others 3¾ and 4 in. in width. The results have been very satisfactory, and indicate that the change was a very proper one.

The 155th Street Viaduct.

This structure is to connect the heights at St. Nicholas Place, New York, with the McComb's Dam Bridge. It is about 1,600 ft. long and descends to the river on a grade of 4.75 to the 100, passing high above the grade of the avenues and elevated railroad. The estimated cost is about $600,000. Under a recent act of the Legislature the McComb's Dam Bridge will be at once replaced by a new structure in stone and metal which will cost about $1,250,000 exclusive of land damages. The alignment of this latter bridge will be considerably changed to bring it it into better line with the approaches at either end. The two structures together will be among the handsomest and most important engineering works in the city. The plans for the 155th street viaduct have been made by Mr. A. P. Boller, Consulting Engineer to the Department of Public Works, who has also received orders to prepare plans for the bridge. The viaduct is, as said above, about 1,600 ft long. The highway is 40 ft. wide and the two side walks 10 ft. each, making 60 ft. over all. The superstructure is of plate and latticed girders, all of the metal work to be of steel excepting lateral bracing, sway bracing, lattice bars, corner brackets and fascia plate, which may be of wrought iron. The floor is buckle plates covered with concrete, the highway paved with granite blocks. The designer has aimed to get the best architectural effect possible within the limits of the material and cost and not to build a railroad trestle. The result is a design of much dignity and elegance.

Minnesota Point Drawbridge at Duluth.

Mr. A. P. Boller has submitted to the Board of Public Works at Duluth plans for the foundation and superstructure of the drawbridge across the ship canal at Duluth, Minn. Bids for the substructure are now called for. The draw span is designed to be 480 ft. long, one arm to cover the canal and the other over railroad tracks and other right of way on shore. On either side will be approaches of girder work on trestle piers, the whole covering about a mile. The design is for single track with sidewalks and highway. The estimated cost of the bridge is about $250,000, and for the whole work, exclusive of right of way, about $400,000. The draw span will be of essentially the same design as that over the Thames River at New London, Conn. It is to be built of steel, the trusses to be 24 ft. apart, centre to centre, to admit the railroad and two sidewalks. The highway will be carried on cantilevers outside the trusses. The panels will be 25 ft. long. The turntable will be rim bearing, running on 58 cast steel wheels 20 in. in diameter, 10-in. face. The bridge is designed to carry, in addition to its own weight, a moving load of two 86-ton consolidation engines, a trainload of 3,000 lbs. per lineal foot and a highway load of 500 lbs. per lineal foot for each roadway. The foundation will be masonry on piles. and it is proposed to sink the piles by water jet. Borings have revealed a crust of hard gravel 13 ft. deep, overlying fine, sharp sand. These borings have been carried to about 80 ft. below the bottom of the canal. The proposition to use the water jet is based on the difficulty of driving piles in the sand as close together as they should be without the risk of overdriving. It is proposed to dredge at least 6 ft. below the bed of the canal before driving and cut off the piles one foot above the dredged bottom in order to allow for scour.

THE SCRAP HEAP.

Notes.

The through train from Boston to Pennsylvania over the Poughkeepsie Bridge has received considerable patronage, although it runs "solid" only as far as Phillipsburg, N. J. It is announced in Boston that a through night train is to be put on each way. The westbound train will leave Boston about 9 p. m.

A general strike of yard trainmen on all the roads centering in Cleveland was begun on Monday night last. Five hundred men struck, demanding the Chicago rate, which is an advance of about 20 cents a day, and a reduction of hours from twelve to ten. Dispatches are vague, and the situation on Wednesday seemed to be still unsettled, though the roads were apparently moving a considerable share of their freight and taking no active steps to conciliate the strikers.

Car Seals for Bonded Freight.

The Secretary of the Treasury has accepted the offer of the Buffalo Seal & Press Co. to supply the Boughton safety seal for cars carrying appraised goods and goods in transit through Canada at $2 per 1,000, and to supply seals for packages at $3 per 1,000. He also accepted the offer of the Ames Sword Co., of Chicopee, Mass., to furnish locks for bonded warehouses at $7.50 per dozen, and decided to continue the use of the locks heretofore supplied by W. F. Beasley, of Baltimore, for securing cars carrying unappraised goods, at the rate of $2.50 apiece.

Wages on the East Tennessee, Virginia & Georgia.

The pay of engineers doing duty on switch engines has been increased from $2.75 to $3 per day; road men will receive at the rate of $3.45 per day for extra time. It has been decided to allow hostlers at points where they have not been allowed before.

To Locomotive Engineers.

He who jumps and runs away
May live to draw a lot more pay.—*Chicago Post.*

An Engineer for New South Wales.

The government intend, when dealing with the question of filling the place of Mr. Whitton, late engineer for railway construction, to invite applications from England and America, as well as from the Colonies.—*Colonies and India.*

"Leading Citizens" Rob a Train.

Napoleon McDaniels, James Ratcliff and John B. Williams, "leading citizens" of Texarkana, were arrested last week at Little Rock, Ark., charged with train robbery. It is said that proof has been obtained that they robbed and wrecked the train on the Cotton Belt road on the night of June 10.

Charles Baily, one of the men who robbed a Northern Pacific train at New Salem, N. D., June 8, was captured two days later and was held to the United States District Court in the sum of $5,000.

The Channel Tunnel in the House of Commons.

This question came up again on the 5th inst., when Sir Edward Watkin moved the second reading of the Channel Tunnel bill: He said the bill had been drawn with a view to meeting, as far as possible, the views and, he was going to say, the prejudices of the government. It proposed simply to authorize the continuation of certain experiments which had been conducted hitherto with no inconsiderable success, and then it proposed to give to the Treasury of the government for the time being the power of saying, should these experiments prove to be a complete success, whether the tunnel should be made or not. The advocates of the tunnel contended, and this was a point to which he particularly wished to draw the attention of the President of the Board of Trade, that it was necessary to carry out these experimental works in obedience to pledges that were given by the government presided over by the late Lord Beaconsfield, and agreements which he made with the government and people of France.

For reasons which Americans find it difficult to sympathize with, the party in power has always opposed Sir Edward's proposal. In this debate Sir Michael Hicks-Beach opposed it for the Government, referring to the necessity for building fortifications and a probability that vessels from India would break bulk at Marseilles or even Brindisi, and ship their freight through by railroad, which he asserted was the view of all the highest parliamentary, military and scientific authorities. Sir Michael also referred to Mr. Gladstone's change of views on the subject, which led to some fencing, in the course of which Mr. Gladstone said that he made no objection to the definition, but he thought it well that it should be clearly understood that by the highest authorities the right honorable gentleman meant such authorities as happened to agree with him. The reading of the bill was postponed "until that day six months" by a majority of 81, which was the fifth time the bill has been rejected. In 1888 the majority against it was 142 votes.

The Trans-Caspian Railroad.

In addition to the projected Siberian railroad Russia is apparently proposing to extend its Trans Caspian railroad, as surveys have been ordered between Samarkand the present terminus of the road, and Tashkend. This will carry the road about 190 miles nearly northeast and across the Syr-Darya.

Train-Dispatchers' Convention.

The third annual convention of the Train-Dispatchers' Association of America convened at St. Louis, June 10. The President, A. A. Zion, of Indianapolis, Ind., was in the chair and Mr. W. L. Eggleston, of Louisville, Ky., officiated at the Secretary's desk. The other officers of the organization are: J. F. Branton, Wilmar, Minn., Vice-President; W. H. Graves, Winona, Minn., Chairman of the Executive Committee. About 100 delegates were present. President Walbridge, of the City Council, welcomed them to the city and the President then road his annual address. In the evening the delegates were banqueted at the Lindell.

Union Pacific Wages.

A despatch from Omaha states that Vice-President Holcomb, of the Union Pacific, has granted the demands of the freight conductors, brakeman and baggagemen for increased pay. Hereafter freight conductors will receive 3 cents per mile for 100 mile runs and twenty cents per hour for overtime. The number of passenger crews between Omaha and North Platt is to be increased from six to ten—including the fast mail and Grand Island local—from North Platte to Cheyenne, there will be five, and between Kansas City and Denver, twelve—six on each division. On local freight runs, conductors are to be paid $95 a month and brakemen $70; baggage men on the main line, $85 per month. Train men shall, after continuous service of sixteen hours or more, be allowed eight hours off. A conductor at full pay must be sent with every light engine that goes over the road.

Traveling in India.

Colonies and *India* learns that the following notice has been issued by the Bengal police authorities to passengers on the Eastern Bengal Railway: "Passengers are hereby cautioned against taking anything to eat or drink from unknown persons, as there are many who live by poisoning travelers. They first of all court acquaintance with passengers in a *sarai* or some other place, and then gain their confidence on the plea of being fellow-travelers going to the same place. When they reach a place convenient for the purpose, they poison the water or food of the passengers, who become insensible, and then they decamp with all their property. They also at times poison the passengers' water, when being drawn out of wells, or sweetmeats brought from the bazaar, or food when being cooked."

Discipline is for the Interest of Employes.

Colonel Haines refers in his address at the Time Convention to the fact that maintenance of discipline is as essential to the safety of the employés themselves as to the protection of the lives and property of the stockholders. This point has a very important bearing. Every practical railroad man knows that engagements are most sought for in the service of those companies whose officers most strictly enforce discipline. The best class of men will not engage with or remain in the service of a road where the discipline is lax. All employés, good or bad, regard with contempt an officer who cannot control those who serve under him, even when they are themselves the apparent beneficiaries of his imbecility. There are about 700,000 railroad employés in this country. Out of this whole number probably not less than 500,000 are permanently employed. Among these we venture to assert there could not be found over 10,000 whose honest opinion would not favor the maintenance of strict discipline.—*Official Guide.*

RAILROAD GAZETTE

Published Every Friday,

At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The summer conventions of the American Society of Civil Engineers are always delightful occasions. The scientific element is gently stimulating without being oppressive; the social element is cordial but sufficiently self-restrained, and over all is a sense of dignified repose which suits the spirit of one who wishes to loaf and enjoy his friends and not think too hard. In times past we have grumbled because the conventions have not given time enough to work; but after all it is very much a matter of moods. Whether or not a convention works too much or plays too much depends a good deal upon how tired a man is when he goes to it. The convention this year ought to satisfy every one. A secluded place has been chosen, far from cities, where those who want a quiet vacation can take it. Excursions to places of uncommon interest are planned for the more energetic ones; while the papers and the committee reports will sustain the dignity of the occasion and give to those who want to think and talk ample opportunity for both. An uncommonly long and important list of papers is announced; the titles so far presented number 15. The committee reports also include some important ones. Perhaps the one of most real and immediate importance will be that on revision of the constitution. The committee on standard rail sections will also be likely to bring up material for discussion, although we suppose its work is not yet advanced enough for any action. The committee on methods of testing structural material ought also to make a valuable report. The committees on standard time and on cements and mortars need not be mentioned; we have them always with us. Altogether there is good reason to expect a convention of the Society more than usually pleasant and useful, and that is saying a good deal.

In the last annual report of the Interstate Commerce Commission, among the "points decided" we find in bold capitals, "Concession of relief terminates the controversy.—Manufacturers & Jobber's Union of Mankato *vs.* Minneapolis & St. Louis R. R. Co." Recent events show that the controversy was not terminated. The Commission has just made a new decision in the case, which reaffirms, with somewhat more emphasis, the principles concerning local discrimination which have guided it ever since the decision in *Boards of Trade Union of Farmington, vs. R. R.* The point simply is this: Rates to or from places on different branches of the same railroad, must, under similar circumstances of distance, etc., be substantially equal; and if the circumstances are somewhat dissimilar, the difference in rates must not be out of all proportion to the difference in circumstances. There can be no question that it is good public policy to have the rates on different branches as nearly equal as possible for the same articles. To violate such equality, is, as a rule, to charge what the traffic will not bear. Much harm is done by freight agents in checking business on one branch, while that of another is built up. But it is going to be very hard to enforce the decisions of the Commission. It is all very well to say that rates shall be the same under similar circumstances; it is a much more delicate thing to insist that they shall be only moderately different under moderately different circumstances. Where and how are we going to draw the line between a moderate or an immoderate difference? If the Commission tries to settle cases of this kind, short of a general assumption of the rate-making power—if it be urged that this decision simply follows the precedents of English law as seen in the case of *Richardson and others v. Midland*—the reply is that this decision has pretty nearly proved a dead letter. The success of the English Commission in enforcing the authority which it then assumed was not such as to make it wise for the Interstate Commerce Commission to follow in its footsteps.

The Master Car-Builders' Convention.

At the convention of the Master Car-Builders' Association this year no reports were presented and no action was taken which will attract very general attention. The work was nearly all in the way of routine. It was necessary work, but not striking, and so far as can now be foreseen, it was the kind of work that must be expected for some years to come Great questions do not come up every year, and perhaps it is fortunate that they do not.

Among the subjects assigned to this year's committees the one that calls for the most original work, and that will be likely to bring out the most new facts, and eventually to have important effects on practice, is the investigation of brake shoe metal. The committee on this subject has, as is now well known, begun careful tests of shoes of various metals, and we have recently published a preliminary report of the work of one of its sub-committees. Only a brief progress report could be made this year. It is reasonable to expect that the work of the committee next year will be of much more than ordinary value, and will finally be embodied in a report that will take a place among the best ones that the Association has produced.

The report of the Committee on Steel Plate and Malleable Iron in Car Construction was one of a useful kind. It gives in a condensed form some valuable information on a special topic, and more reports of the same sort could be made with great advantage to the Association. This report might well have been more voluminous and embodied drawings of more parts and more statistics of their cost, weight and wear; but we are informed that the committee found it very difficult to collect the information. Two features of this report were somewhat criticised by various members. It was criticised in that it makes no recommendations, and that it advertises certain special products. Neither of these criticisms seem to have much weight. There are many topics which are not proper subjects for recommendations, but which are excellent subjects for investigation, and on which the Association should be well informed, and concerning which committees can collect and summarize information to the great saving of labor on the part of individual members of the Association. This is one of them, and we have a good deal of respect for a committee which has the self-restraint to state facts and stop short of recommendations. As for the fact that the report mentions several manufacturers by name that was almost necessary in giving a sketch of the condition of a new industry. Of course, this is a matter to be handled with great discretion, as an editor knows better than any one else. Doubtless it is a bad precedent to mention in the official transactions and publications of the Association the product of any particular house. On the other hand, it is foolish to refrain from mentioning a good thing or from giving useful information for fear of advertising some one. But the line is an arbitrary one and often hard to draw. On the whole, it is probably best that the executive committee should draw it pretty strictly.

The report on interchange of passenger cars we printed last week. To a few roads this is very important, but to most it means but little.

Perhaps the most important action taken in the convention was in the passage of the two resolutions on standards. By one resolution a committee is to be appointed to look after the Association's standard brake rigging for air-braked cars and to recommend such steps as will promote its use. By the other resolution the Executive Committee is charged with the duty of keeping the coupler up to the standard lines and empowered to establish gauges and templets. Another step in the same direction was made by the adoption of the clause in the Rules of Interchange authorizing the use of the M. C. B. standards in repairs. All of this is very important. It is obvious that standards do not get into use by mere adoption. For a long time they must be watched, and departures from them be ascertained and made known. The tendency of individuals is always to depart from them. This is now especially remarkable in the coupler lines concerning which we wrote last week, and if the Executive Committee can get up satisfactory gauges for them the makers and the railroad companies will be saved a good deal of grief. On the whole, we expect that the operation of the two resolutions and of the amendment to the interchange rules will do a good deal to impress upon railroad officers and manufacturing companies the importance of sticking closely to the standards in fact as well as in theory.

Another resolution was passed at this convention which we think will have a good effect at future conventions. That was the one designed to get the committee reports into the hands of members as early as June 1. It will be a surprise and a disappointment if the quality of the discussions is not greatly improved if this plan is thoroughly carried out.

The preliminary work on the Rules of Interchange this year was especially careful. The Arbitration Committee took measures to have them discussed by the railroad clubs and received many suggestions as the result of long and thorough consideration of them by those clubs.

On the whole the year's work has been, as we have said before, not brilliant, but of a good average quality.

From Denver to Salt Lake.

Many people think that the process of parallel railroad building, which manifested itself so strongly in Kansas and Nebraska in 1887, must in the next speculative period move over Colorado, so that Salt Lake City would in a few years stand commercially where Denver does now. The opening of a standard gauge route across the mountains, via the Colorado Midland and the Rio Grande Western, which is just at the point of completion, has turned men's minds strongly in this direction. A correspondent whose letter we publish this week attempts to forecast the future on the basis of these ideas.

We are by no means able fully to agree with his conclusions. The parallel between Salt Lake to-day and Denver half a dozen years ago is not so close as appears at first sight. The extension of the Missouri River systems westward, from Kansas City to Colorado points was a matter of course. The ground was of such a nature that railroads could be built almost anywhere at comparatively slight expense. If a central road wanted a Colorado connection, it was easier for the directors (though not always better for the stock holders) to build a new line than to make a traffic agreement with an existing one. The prosperity of the roads which were first in the field intensified the danger of duplication, because it made investors exaggerate the probable profit from new lines, so that they were only too ready to lend their aid to the schemes of speculative directors.

This easy country comes to a sudden stop at the 105th meridian; that is, at a line just east of the middle of Colorado, running from Cheyenne, on the north, to Trinidad, on the south, and passing through Denver, Colorado Springs and Pueblo. Until we reach this line everything is easy; beyond it everything is hard. From a country in which railroads can go almost anywhere we suddenly pass to one in which they can go almost nowhere, except at enormous expense. By turning northward beyond Cheyenne the Union Pacific has an excellent route; the Atchison obtains a good one by turning sharply to the south at Trinidad. But between these two, for a belt of nearly five hundred miles, there has been until the present year no standard gauge through route across the mountains.

The Colorado Midland had crossed the barrier at the end of 1889, but its through connections are still barely completed. The standard gauge (Leadville) line of the Denver & Rio Grande can hardly be regarded as a distinct route from that of the Colorado Midland. The Marshall Pass route of the D. & R. G., which has been the main line of communication across Colorado, could not be made standard gauge without entire reconstruction, and then only under the greatest difficulties. The same might be said of the old Veta Pass line of the D. & R. G., which has the further disadvantage of not as yet leading anywhere in particular; while the country traversed by the narrow gauge lines of the Union Pacific is equally difficult.

Not only is the original cost of railroads in Colorado high, but the elevation to be surmounted prevents the operating expense from being made correspondingly low. Salt Lake is separated from the east by a barrier more effective than distance. The country between Salt Lake and Denver is a very different thing geographically from that between Denver and Kansas City. Engineering science may surmount the difficulties, but it cannot annihilate them. Nor do we believe that the time has yet come when it will pay to surmount them at more than one or two points.

The present prosperity of the Colorado lines, to which

our correspondent alludes, is very much less marked than that of the Missouri River lines a few years ago. As compared with their condition at some other times, many of the Colorado lines are undoubtedly prosperous; but as compared with the amount of outstanding securities, or the probable cost of duplication, their income is none too large. It is quite certain that parallel railroad building in the Colorado Rockies would be disastrous; and, what is more to the purpose, it is doubtful whether investors would be ready to risk their money in enterprises of that kind.

We do not take a pessimistic view of the future of Salt Lake; but we believe that its growth will be influenced by other causes than those which have affected points further east. We very much doubt whether railroad facilities will be developed greatly in advance of local needs, as was the case in states immediately west of the Missouri River, and as is now, to a certain extent, the case at points further north. We believe that Salt Lake will grow, and will have more and more railroads. But we believe that these railroads will be a consequence of the growth rather than an independent cause. We are not ready to believe that lines will be recklessly pushed across Central Colorado at elevations of 10,000 ft. and upward, at an obvious present loss for the sake of an uncertain share of future profit.

How to Get Good Service from Trainmen.

The subject of payment for overtime, by the hour, for detentions suffered by engineers and other trainmen on freight trains is one that always receives a good deal of attention from the careful superintendent. If trains are habitually behind time men who are paid by the trip naturally begin to grumble, and the only fair way of meeting their complaint is by allowing them additional pay. But just as soon as a schedule of rates for payment by the hour is established, it becomes necessary to look out for the lazy or shrewd men who will take advantage of the system to put in more time than the work really demands. It will be remembered that one of the principal bones of contention in the switchmen's strike at Chicago in 1888 was the alleged unreasonable delays caused by lack of energy on the part of crews sent long distances from home among the labyrinth of tracks scattered throughout that city. We say alleged delays because we have no data at hand concerning the actual extent of trouble from this source, though if Chicago switchmen are endowed with the average quality of human nature they no doubt furnished a good basis for the statements concerning their dilatoriness made at the time. The radical difference in the motives actuating men who are working by the piece and those working by the day is as old as the instinct of selfishness, and of course applies in freight train work as well as in making shirts or selling books.

Most division superintendents nowadays have so many crews under their charge that they find it impossible to look personally after the performance of all of them and as a consequence the payment of compensation for overwork has to be adjusted, as far as possible, by a general rule. To carefully consider each instance is regarded as impracticable and payment by the hour for all time spent on the road over 10, 11, 12 or some other fixed number of hours per trip is formally agreed upon. This is especially the case in dealing with engineers, who, by their compact organization, have been enabled to present more cogent arguments than have the men engaged in other classes of train work.

While on most roads this plan works without much friction, the division superintendent escaping criticism if the amount or percentage of extra pay on the monthly pay-roll does not greatly exceed the same for a previous similar period or does not vary too much from some preconceived standard, other managers are not satisfied. The men being under constant temptation to increase their wages a trifle, have to be constantly looked after, and all delays at meeting points and elsewhere have to be constantly watched by the trainmaster or dispatcher in order to see that dilatory habits are not becoming too common. This is an onerous duty and thoughtful officers who recognize the wrong principle involved in a system under which it is possible for men to increase their pay by decreasing their work, desire to get something better. They are not unwilling to give close attention to the performances of their men on the road, but they prefer to have the results of such attention show in something besides mere repression of fraudulent claims for wages. To encourage these officers we wish to mention one enterprising superintendent of our acquaintance who has succeeded in introducing a better plan. Having come to the conclusion that the overtime system did more harm than good, he arranged his time-table so that trains could ordinarily make their time without difficulty, and has now succeeded in entirely abolishing the hour-rates, with the exception that certain men, if delayed, after being called for their trains, are paid for the time wasted if they are held two hours or more before being sent out. Delays of this kind are generally from causes which can readily be ascertained and removed, so that there is really no chance at all for unfair dealing by the men. This superintendent finds the result so satisfactory that he would even increase the rate of pay per trip, in case of a serious disagreement about the total compensation, rather than introduce the hour rate with its accompanying annoyances. His freight trains now adhere to the time-table as closely as do the passenger trains. Of course, some of the credit for this regularity of trains is due to the officers themselves in removing obstacles of various kinds, but it is evident that as long as it can be kept up the question of overtime cannot arise. We take it for granted that unusual delays, such as those caused by serious wrecks or snowstorms, are always properly allowed for without regard to any system.

Another interesting example of the increased efficiency that may be secured in train service by close adherence to the principle of securing the men's undivided attention to the quality of their work rather than to schemes for increasing pay regardless of the amount of work done, is to be found on the Seattle, Lake Shore & Eastern. Some of the methods on this road were described in the *Railroad Gazette* of May 23, pages 359 and 363. As will be remembered, the trainmen on this road are incited to energetic work by the hope of a prize at the end of the month. The road has, however a schedule for paying some of its men by the hour for overtime, and before the inauguration of the prize system 15 per cent. of the total amount of the pay rolls was for overtime. By the adoption of this system of furnishing a lively motive for doing first-class work with promptness and care, the gross amount for overtime has been reduced to less than one-half of one per cent., and this within two months. The good results in other respects, which were mentioned in the article referred to, are still maintained, the decrease in pay rolls being accompanied by an increase of 62 per cent. in the number of cars handled per engine mile. The road in question is crooked and hilly, and the freight trains have a variety of work to perform which makes it more difficult for a dispatcher to lay out the work beforehand than would be the case on an older road or one with more settled traffic. Under such circumstances the value of energetic and intelligent work on the part of trainmen is more marked than where level lines, long trips and other conditions tend to lessen the importance of "gumption;" but after making allowance for all these things we must still give much credit to the system employed.

As these facts speak for themselves, we shall not take the reader's time to enlarge upon them. Although the cases cited may be called isolated instances, the mere recital of them will suggest to most superintendents a number of more or less favorable openings where they can make a trial of the methods described. As a further point of interest in the prize system of the Seattle, Lake Shore & Eastern, we give below an outline of one portion of the train dispatcher's daily report, from which were taken the data for some of the columns of the report illustrated in our issue of May 23. The spaces left for the insertion of figures are much larger than here shown and are so arranged that the figures all stand in the same vertical column.

PERFORMANCES AND COMPARISONS.

Freight Performances.—Freight trains run east and north....Freight trains run south and west.... Total Freight trains run to-day....Total Freight trains run to date this month...Total Freight trains run to date last month....Increase or Decrease..Total Freight trains run this year to date....Total Freight trains run last year to date....Increase or Decrease... Total loads moved east and north to-day....Total Emp. moved east and north ..Total Emp. moved west and south to-day....Total loads moved west and south to-day....Total cars....Average cars per train....Total loads moved to date this month... Total loads moved to date last month....Increase or Decrease..Total Emp. moved to date this month ....Total Emp. moved to date last month....Increase or Decrease..Total loads this year to date.... Total loads last year to date... Increase or Decrease.... Total Emp. this year... Total Emp. last year....Increase or Decrease....Average per train this month... Average per train last month... Increase or Decrease....Average this year....Average last year....Increase or Decrease....

Passenger Performances.—Trains run north and east to-day....Trains run south and west to-day..Total trains....Total passengers carried, paid....Total passengers carried, D. H ...Total trains to date this month ....Total trains to date last month..Increase or Decrease..Passengers carried this month....Passengers carried last month....Increase or Decrease..Passengers carried this year....Passengers carried last year ....Increase or Decrease....Trains run this year.... Trains run last year....Increase or Decrease....

General Information for To-day.—Kind of cars short to fill orders: Box....Stock..Flats....Coal....Log....Number of surplus cars over demand: Box... Stock... Flats ....Coal....Log....Loads left over for north and east.. . Emp. left over for north and east..Loads left over for south and west...Emp. left over for south and west .... Weather .... from ... to .... Weather .... from.. . to....

A space follows here for report of bad order cars set out, etc.

The Board of Trade and the Railway and Canal Commission.

The framers of the English Railway and Canal Traffic Act of 1888 were much impressed by the success of the Interstate Commerce Commission in settling a great many complaints without ever allowing them to come to trial. They tried to provide for some such result in England; not by imposing upon the Railway and Canal Commission the duty of making preliminary and informal inquiries, as is done by the Interstate Commerce Commission, but by charging the Board of Trade with that duty. The separation of functions seems an unfortunate one, for many reasons.

To make the matter clear, let us consider on what ground the existence of a semi-judicial commission is justified. Why not leave the whole thing to the courts? It is because the courts have not the necessary technical and economic knowledge to deal with some of the questions which arise between railroads and shippers. The attempt to apply a precedent which worked very well on roads or canals may be disastrous on railroads, unless the judge knows enough to look below the surface. Unintelligent use of such precedent is almost certain to defeat its own ends. Witness the futile efforts of the courts, not so many years ago, to allow competing carriers on the same line of railroad, and to base each individual rate on cost of service. A body of men with the special training needed to clear up the technical difficulties of the problem, could present the matter to the courts and to the public in such a way that people would know what they were really doing. This was the most important work of a well-constituted commission.

In the work of such a body, it frequently happened that when the technical difficulty was straightened out the law on the subject was clear; so clear that both railroad and shipper took the same view of the situation, and there was no need of bringing the matter to trial. How often this happens is shown by the experience of the Interstate Commerce Commission. In settling such cases no legal authority is necessary. Good sense and technical knowledge on non-legal matters are the chief requisites. If it is fairly certain that the courts will look at these extra-legal matter in the same light that the commission does, we have all the authority which is needed or even desirable.

The attainment of this state of things is rather favored by the American law, and decidedly hindered by the English. The separate settlement of economic and legal questions is in England rendered almost impossible. What body in England has any authority of the kind just described? The Board of Trade might have it, if it were not for the commission; but as it is, the commission is bound to review the technical points in the cases as well as the legal ones. That is the only ostensible reason for the existence of commission; and it deprives the findings of the Board of Trade of the authority which they would otherwise possess. But this influence is not transferred to the commission. On the contrary, the judicial character of that body makes it certain that legal and technical reasons will be so mingled in its findings that a court of appeal, in reviewing a case, will take up the whole matter rather than the non-technical parts of it.

The report of the year's work in adjusting complaints which the Board of Trade has recently laid before Parliament, throws a good deal of light on these difficulties. The work of the board has not been without its usefulness; there have been a great many cases where it has been the means to a friendly discussion and adjustment of difficulties. But the board is obviously hampered by the existence of the commission half way between itself and the courts. It does not get some of the cases which it might readily settle without litigation, and it is prevented from settling some of the cases which it gets. The Board of Trade, which has the duty of preventing complaints, is deprived of most of its moral authority by the existence of the commission. The commission, which has the authority, does not use it, because it simply hears complaints and does not try to prevent them.

It is a little hard to judge at this distance; but it seems as though the objects of the English law could be much better accomplished by a change of system. The most effective way would probably be to abolish

the commission wholly, recognizing only the Board of Trade for technical matters and the courts for legal ones. But if a backward step of this kind were out of the question, the next best thing would be to charge the commission with the duty which now devolves upon the Board of Trade, of trying to prevent litigation by furthering amicable arrangements between the parties at variance. Perhaps an English lawyer with a salary of $15,000 a year would think it beneath his dignity to engage in a task of that kind; but it is just this work which furnishes the reason for the existence of a commission like the English; and the importance of having it well done can hardly be overestimated.

A somewhat novel question has arisen in connection with the piers of the Hawksbury bridge, the largest in Australia, but chiefly remarkable for the fact that the foundations are the deepest in the world, the deepest pier being down 160 ft. below high water line. As the bridge is 40 ft. above the water, the greatest height of the piers reaches 200 ft. The depth of water is not great, nor is the tidal current or range excessive, but the bed of the river is composed of a great depth of soft mud. The prevailing rock of the district is sandstone, little disturbed, but very generally deeply eroded, forming narrow valleys, often with precipitous sides of considerable depth. Some anxiety appears to have been felt as to the stability of the foundations, which were excavated by Anderson & Barr, for the Union Bridge Co., as has been fully described in these pages. Observations show some irregular and frequent lateral motion of the piers, the greatest being about 2½ in. The motion is singularly irregular, being up stream one day, down stream the next and altogether absent on the following day. It appears doubtful whether any irregularity in the working of the expansion rollers has any influence on this motion, and engineers are much divided in opinion both as to its cause and importance. Some consider that a small amount of motion is inevitable on the summit of a pier over 200 ft. high, while others contend that it shows that the piers have an irregular bearing at their base, and probably rest on a ledge of rock at one corner. Owing to the winding form of the narrow, deep valley through which the stream flows, the bridge is somewhat sheltered from the wind, and the changes of temperature are moderate, the extreme range being about 70 degrees. The bridge is double track and the maximum speed of passenger trains over it is about 30 miles per hour. As it is situated near the foot of a long grade of 132 ft. to the mile, some of the trains are double-headers. It is, of course, obvious that on a double-track bridge the load is not exactly above the centre line of the pier, and it is possible that the vibration of a heavy train may cause a slight rock in a tall pier resting on a soft and uncertain foundation. There is no vertical movement.

The most startling piece of railroad legislation yet proposed the nation owes to that new state, Dakota. Representative Gifford, of Dakota, introduced in Congress last Tuesday a bill providing that all railroad companies shall in future substitute a homogeneous steel cross-tie instead of wood, under a penalty of $1.50 for every wooden tie used five years after the passage of the act. The bill authorizes the President to appoint three persons to investigate patented metal cross ties to determine upon three of the best ties to be used. "The cost of the steel tie shall not exceed $1.50 each, and they must be so constructed as to keep the track in line and prevent the rails from spreading." The bill appropriates $75,000 for the expenses of the commissioners. We do not know of any homogeneous steel cross tie offered in this country at $1.50, but if one that can be used is made at that price by any of Mr. Gifford's constituents, they had better advertise it. They will probably be able to sell it without the help of the government. Even with the help of the government they will have a hard time getting it introduced in the place of all wooden ties within five years unless the government undertakes to pay the cost. At a very moderate estimate these ties would cost in place as much as the entire gross earnings of the railroads of the United States for 1888, say $951,000,000. There is still another difficulty in the case. Steel ties for all the railroads of the country would take about 25,000,000 tons of steel In the latest edition of Mr. Swank's "Directory of Iron and Steel Works," the annual capacity of the Bessemer and open-hearth furnaces of the United States is estimated at 6,800,000 tons. So if Mr. Gifford's bill passes we shall be bothered to get steel for other uses. But perhaps it will not pass.

A freight train was wrecked and three trainmen killed on the Cnesapeake & Ohio, June 12, by the washing-out of a stone culvert over Bull Creek, near Maysville, Ky. A cloudburst had swollen the stream to such proportions that it lifted a saw mill from its foundation and floated it, together with a hundred logs and other drift, down-stream, where the whole mass was hurled violently against the culvert. Heavy storms the same day caused inundations in New York state. The New York Central track was submerged at Aurelius. The Rome, Watertown & Ogdensburg had a bad washout at West Camden, and a passenger train was badly derailed. On the following day there were severe floods in Northern Illinois and southern Wisconsin. The Illinois Central suffered seriously near Dodgeville, Wis., and had a large bridge swept away at Rockford, Ill. The Chicago & Northwestern track was washed out near Aurora, Ill. On the 15th a severe storm prevailed at Wheeling, W. Va. There were innumerable washouts on all the railroads, and trains on the Baltimore & Ohio, Ohio River, and Cleveland & Pittsburgh were delayed from two to twenty hours. Near Batavia, O., the Ohio & Northwestern Railroad track was washed out and a bridge was carried away.

The city of Cleveland has just officially adopted Central standard time and the railroad companies have now for the first time put it in use in their shops, where the work has heretofore been conducted according to local time. The roads have agreed to make no changes in the working hours, so far as solar time is concerned the change being wholly in the names given to the hours for beginning and stopping. Where work has begun at 7 a. m. it will hereafter begin at 6:27.

The Westinghouse and the Eames brakes have been entered for the approaching trials in South Australia. The Eames company will enter its new pressure brake. The only other entry is that of a new colonial brake by Messrs. Tadman and Barling. The English automatic vacuum will probably not compete, the quick-acting attachment not having yet come into practical use on any railroad.

LOCOMOTIVE BUILDING.

The New York Locomotive Works, of Rome, N. Y., was awarded a contract last week for building eight 45-ton locomotives for the Charleston, Sumter & Northern.

The Birmingham Mineral has just received two large freight engines from the Rogers Locomotive Works, Paterson, N. J.

Ten of the 25 Wooten consolidation freight engines ordered by the New York, Lake Erie & Western, from the Baldwin Locomotive Works, of Philadelphia, have been delivered.

The Baldwin Locomotive Works secured the order for building 30 of the new passenger locomotives for the Manhattan Elevated. The engines are to be delivered in December, 1890.

The Wheeling & Elm Grove will, it is reported, soon order some heavy locomotives.

CAR BUILDING.

The Merchants' Dispatch Transportation Co. is asking bids on 500 refrigerator cars.

The Louisville, New Orleans & Texas is receiving bids for 600 box cars.

The Wheeling & Lake Erie has ordered 200 coal cars.

The Charleston, Sumter & Northern has placed an order with the Lehigh Valley Car Co., of Stemton, Pa., for 175 box cars and 25 platform cars. The cars will be 34 ft. long.

The Duluth & Winnipeg is reported in the market for 1,000 freight cars, but this is probably the same order as that referred to several months ago.

The Central of Georgia has recently completed three passenger and 50 platform cars at its shops at Macon, Ga.

The Baltimore & Ohio has divided the contract for 3,000 box and gondola cars among the South Baltimore Car Works, the Pullman Car Co. and the Wells & French Mfg. Co., of Chicago.

The Manhattan Elevated has awarded a contract to the Wason Mfg. Co., of Brightwood, Mass., for building 50 new passenger cars. The order for the balance of 32 cars for which bids were asked will not be awarded at present. The cars are to be delivered in October and November.

The Pullman Car Co. has just finished seven parlor cars for the Rio Grande Western.

BRIDGE BUILDING.

Asheville, N. C.—J. A. Williams, Jr., is interested in a proposed highway and electric street car bridge to be built across the French Broad River at Asheville.

The Asheville Construction & Improvement Co. has been recently organized at Asheville, and among other objects proposes to build an iron bridge. G. F. Powell is President and W. W. Barnard is Secretary and Treasurer.

Brooklyn, N. Y.—The Park Commissioners have awarded the contract for building an iron bridge in Prospect Park to the Wallis Iron Works, of Jersey City. The contract price for the superstructure is $15,542. The contract for the granite stone work was awarded to L. E. Brown for $37,000.

Charleston, W. Va.—The Kanawha & South Side Bridge Co. will receive bids for a proposed bridge across the Kanawha River until June 26 at Pittsburgh. It is expected to begin the erection of the structure within 20 days after the contract has been let. B. L. Wood, Jr., is President.

Duluth, Minn.—Proposals for the foundations and masonry for a draw-bridge over the Minnesota Point Canal at Duluth will be received up to July 1. Plans, specifications, etc., can be seen at the office of the Board of Public Works, Duluth, or of A. P. Boller, Consulting Engineer, 71 Broadway, New York. The engineer's estimate of quantities includes about 17,000 cu. yds. of excavation, 1,400 piles, 650,000 ft. of timber, 3,000 cu. yds. of masonry, 45,000 cu. ft. of cribbing, with rip-rap and filling. No one who has not had experience as contractor in the class of work called for will be accepted as a bidder. The plans of the superstructure will not be ready for bids for two or three months yet. Further particulars of this work will be found in another column.

Ellicott City, Md.—The Baltimore & Ohio is building an iron bridge across the highway at Ellicott City, consisting of eight 15 in. I-beams. The new structure is to replace a double span stone arch bridge which has supported the road at this point since its opening, about 60 years.

Glasgow, Va.—The Rockbridge Co. is said to have agreed to pay half the cost of a proposed bridge across the North River between Glasgow and East Glasgow.

Knoxville, Tenn.—The chamber of commerce has petitioned the board of public works to make extensive repairs to the bridge over Gay street, which is considered unsafe, or to build a new bridge.

Little Rock, Ark.—The bridge commissioners and S. J. H. Rickon, bridge engineer, have decided upon the location for the proposed bridge which is to be erected between Broadway and Main street.

Natchez, Miss.—The King Iron Bridge Co. has received the contract at $9,498 to construct an iron bridge 200 ft. long over St. Catherine creek.

Nebraska City, Neb.—A special meeting has been called by the county commissioners and city council to vote July 8 on the proposition to issue $100,000 in bonds to the Nebraska City Highway Bridge Co. to aid in building a wagon bridge across the Missouri River at Nebraska City.

New Albany, Ind.—The county commissioners will erect a new bridge over Knob Creek, near New Albany.

New Iberia, La.—An iron bridge is being built across the Teche River at New Iberia.

New York City.—The Department of Public Works of New York City will receive bids up to July 1, for the 155th-street viaduct. The viaduct will be 1,600 ft. long and will cost about $600,000. The quantities include about 4,000 tons of steel and iron, 4,700 cu. yds. of rock excavation, 10,000 cu. yds. of filling, 6,000 cu. yds. of masonry, besides concrete work, paving, etc. It is required that it shall be completed in 500 days after the date of the contract. A further note about this structure appears in another column.

The New York and New Jersey Bridge Commissioners have decided to open subscription books to the capital stock of the company which is to be organized to build the Hudson River bridge. The surveys and other engineering work will be commenced as soon as $300,000 has been subscribed. A bill has been introduced in both houses of Congress authorizing the erection of a bridge across the Hudson River between 108th and 181st streets, New York City, and the towns of Union and Fort Lee, N. J. The charter from the United States will conform to those granted by the legislatures of New Jersey and New York, which are confirmed by the bill.

Portland, O.—The Wheeling & Lake Erie is building a steel bridge near Portland to carry the tracks of the Cleveland & Pittsburg over those of its Wheeling extension.

Ritchie, W. Va.—The clerk of the County Court of Ritchie County, W. Va., will receive bids at Ritchie for the construction of a 115-ft. steel road bridge over Hughes River until July 12, 1890.

Rochester, N. Y.—The Edgemoor Bridge Co. is building a steel bridge on the Buffalo, Rochester & Pittsburgh over the Oatka River to replace the last wooden bridge on the Rochester division.

Shelburne Falls, Mass.—The contract for an iron bridge across the Deerfield River at Shelburne Falls, Mass., has been awarded to the Vermont Construction Co., of St. Albans, Vt. The bids received were as follows: Vermont Construction Co., $14,999; Pennsylvania Bridge Co., $16,200; Boston Bridge Works, $16,202; Rochester Bridge Works, $16,369; King Bridge Co., $16,610; Groton Bridge Co., $16,750; Berlin Bridge Co., $17,290; Hilton Bridge Co., $17,500; Canton Bridge Co., $18,000; Pittsburgh Bridge Co., $18,326; Wallace Iron Works, $20,800; New Jersey Steel & Iron Co., $22,067. All the plans and specifications submitted by the bidders were in accordance with those prepared by E. S. Shaw, of Boston, Consulting Engineer.

Sioux City, Ia.—The State Railroad Commissioners of Iowa have ordered that a viaduct be built across the tracks of the Illinois Central and Chicago, St. Paul, Minneapolis & Omaha on lower Court street, in Sioux City. The bridge is to be 180 ft. long with approaches 450 ft. long on either side. The width will be 65 ft., with two sidewalks each 10 ft. wide.

Topeka, Kan.—The County Commissioners of Shawnee County, Kan., ask proposals for the following bridges: 100-ft. combination bridge over Wakarusa creek with two 16-foot approaches, on the Carbondale road, Williamsport township; 30-ft. combination bridge with one 16-ft. approach, over Berry creek, Monmouth township; 30-ft. bridge over Disney branch in Monmouth township; 30-ft. combination bridge on the Young road, Williamsport township; 50-ft. iron bridge on iron tubular piers over Deer creek on Max Henry road. The following contracts for building bridges were let: J. Farley, for a wire suspension bridge across Cross creek, Rossville township, 100 ft. span, $1,000; the contract for the stone arch bridge across Whetstone creek, Tecumseh township, was awarded to M. Howe at $582; the contract for building a combination bridge over Muddy creek in Soldier township, 60 ft. span, was awarded to the Abilene Bridge Co. for $478.

Washington, D. C.—Bills have been introduced in Congress, authorizing railroad bridges as follows: For the Macon & Atlantic, over the Oconee, within six miles of Dublin; over the Ochalgee, within six miles of Tobofkee Creek, Bibb County; over the Savannah, within six miles of the bridge of the Charleston & Savannah, in Effingham County. For the Middle Georgia & Atlantic, over the Savannah, in Effingham County. The Senate bill authorizing the construction of a bridge across the Columbia river by the Oregon Railway Extension Co. has been passed.

Weston, W. Va.—The County Court of Lewis County, W. Va., has appropriated $5,000 for a new steel bridge across the west fork of the Monongabela river at Weston. It will be about 300 ft. long and 36 ft. wide, with sidewalks. A special meeting of the Court will be held July 12 to take final action in the matter.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Augusta & Savannah, $3.50 per share, payable June 3.
Central of Georgia, $4 per share, payable June 23.
Connecticut River, quarterly 2 per cent., payable July 1.
Fitchburg, 2 per cent. on the preferred stock, payable July 1.
Lehigh Valley, quarterly, 1¼ per cent., payable July 15.
New York & Harlem, 4 per cent., payable July 1.

Northern Central, semi-annual, 3 per cent., payable in July.

Northern (*N. H.*), quarterly, 1½ per cent., payable July 1.

Oregon Railway & Navigation Co., quarterly, 1½ per cent., payable July 13.

Richmond, Fredericksburg & Potomac, 3½ per cent., payable July 1.

Rock Island & Peoria, semi-annual, 2½ per cent., payable July 1.

Toledo & Ohio Central, 1 per cent. on the preferred stock, payable June 30.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Adirondack, special, adjourned, 21 Cortlandt street, New York City, July 7.

Charleston & Gauley River, special, Charleston, W. Va., June 30, to consider a consolidation with the Kanawha & Michigan.

Indianapolis & Northeastern, special, Indianapolis, Ind., June 27.

Memphis & Charleston, special, Memphis, Tenn. July 9.

Missouri Pacific, special, St. Louis, Mo., July 15.

Mobile & Girard, annual, Girard, Ala., July 2.

Nashville, Chatanooga & St. Louis, special, Nashville, Tenn., June 25.

Pratt Coal, Iron & Railway Co., special, Birmingham, Ala., June 28.

Shamokin, Sunbury & Lewisburg, special, Philadelphia, Pa., June 25.

St. Louis & San Francisco, special, St. Louis, July 21, to vote on the proposition of an increase of the common stock of the company.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* will hold its next annual convention at Cresson, Pa., June 26.

The *International Association of Car Accountants* will hold its fifteenth annual convention at the Hotel Brunswick, New York City, June 24, 25 and 26.

The *Association of American Railway Accounting Officers* will hold its next annual meeting at the Stockton Hotel, Cape May, N. J., July 9.

The *National Association of General Baggage Agents* will hold its next annual convention at Chicago, Ill., July 16.

The *Traveling Passenger Agents' Association* will hold its next annual convention at Buffalo, N. Y., August 19.

The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The *American Society of Railroad Superintendents* will hold its annual meeting in New York City on the day preceeding the fall meeting of the General Time Convention. C. S. Gadsden, Charleston, S. C., is President, and C. A. Hammond, 350 Atlantic avenue, Boston, is Secretary.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m. The Club has adjourned until Tuesday, Sept. 16.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Association of General Baggage Agents.

The ninth semi-annual convention of the National Association of General Baggage Agents will be held in Chicago, the third Wednesday in July.

The question of a uniform C. O. D. check, as referred to in the circular issued by Mr. Dearing, of the Michigan Central, will again be brought to the attention of the Association, and it is hoped that a final conclusion will be reached and a uniform check adopted.

The Committee of Arrangements have made arrangements for the accommodation of members and their families at the Auditorium Hotel, and ask that those members who desire accommodations advise them to that effect.

Engineering Association of the Southwest.

The June meeting was held at the Y. M. C. A. Building, Nashville, Tenn., on June 12, President John MacLeod, of Louisville, Ky., presiding, with an attendance of thirty-two. A communication was read from Mr. J. W. Adams, of Chattanooga, Member of the Association, suggesting the propriety of considering whether the Association should participate in the courtesies extended the Iron & Steel Institute of Great Britain, and the Verein Deutscher Eisenhüttenleute on their visit to this country in October next. On motion the matter was referred to a committee to correspond with the National Societies having in hand the arrangement of the entertainment.

Mr. Landreth, of the committee on the "Cause of Setting of Cement," reported that owing to the serious illness of one of the members of the committee, the committee had been unable to prepare a report. Chairman MacLeod, from the committee on "Affiliation with the American Society," reported that no member of the committee had attended the meeting of the committee of the American Society at New York on June 4, and asked the discharge of the committee, which was granted.

The subject of joining the "Association of Engineering Societies" was discussed and correspondence with the officers of the Board of Managers of that organization was submitted. On motion the decision was referred to the Executive Committee of the Board, with power to act.

The applications for membership received from the following were referred to the Board of Directors: George S. Burtchaell, engineer in charge of the Rutland & Julien branch of the Alabama Midland Railway, Waycross, Ga., Henry Wolters, architect, Louisville, Ky., Daniel M. Andrews, assistant engineer in charge of the Coosa River Improvement, Montgomery, Ala., and Elmer L. Corthell, consulting engineer, Chicago.

Mr. John B. Atkinson, of Earlington, Ky., read a paper on "Coke Making in the Western Kentucky Coal Field." The paper dealt very extensively with a series of trials and experiments carried on at Earlington, for the purpose of solving for that district the question of desulphurization of coke, which is here made from slack coal only, carrying a higher percentage of sulphur than the coarser grades of coal. The author gave accounts of his travels and investigations seeking light on this subject, but found the condition and character of the coal and the manner of the occurrence of the sulpher in the coal so different from that found elsewhere, that no parallel whatever could be drawn from outside experience. This was verified by repeating at Earlington in succession and without avail, the methods which were elsewhere successful. Mr. Atkinson's results to date are only partial successful, but they are still being prosecuted, and should they be rewarded as the author expects with ultimate success, the result will be of great commercial importance to the Western Kentucky coal belt, whose product is at present unsuited to iron making.

Owing to the unavoidable absence of Mr. A. V. Gude, of Atlanta, Ga., his paper on the "Foundations of the Georgia Pacific Railway Bridge over the Yazoo River, Mississippi," was deferred.

A lunch was served by the local members of the Association, after which the meeting adjourned.

Engineers' Club of Philadelphia.

A regular meeting was held June 7, Vice-President Wilfred Lewis in the chair; 15 members were present and one visitor, William P. Shinn, President of the American Society of Civil Engineers.

On motion of Mr. Henry G. Morris, the meeting officially endorsed the invitation, which had been extended to the Local Committee on reception of the British Iron and Steel Association, to make such use of of the house as they might find convenient.

The Secretary presented, for Mr. Strickland L. Kneass, a description of a new condensing and refrigerating system.

PERSONAL.

—Mr. J. B. Gilchrist, Assistant Superintendent of the Colorado lines of the Union Pacific has resigned, and the office will be abolished July 1.

—Mr. James Reynolds, Engineer of Maintainance of Way of the Cleveland, Loraine & Wheeling, died at his home in Ravenna, O., June 16.

—Mr. Thomas C. Clarke, of the Union Bridge Co., has been appointed Consulting Engineer and Mr. William B. Brush Assistant Engineer, to the New York & New Jersey Bridge Commissioners.

—Mr. Ernest Vleit, General Passenger Agent of the Milwaukee, Lake Shore & Western, is suffering from some mental dorangement. His illness is believed to be only temporary and the result of overwork.

—Mr. S.T. Emerson, Chief Engineer and Superintendent of the St. Louis, Kansas City & Colorado, and Mr. John Gallup, Jr., Secretary and Treasurer of the same road, which is controlled by the Atchison, Topeka & Santa Fe, have resigned, and the line will hereafter be operated by the officers of the St. Louis & San Francisco.

—Mr. John H. Murphy, for several years Master Mechanic of the Buffalo division of the New York, Lake Erie & Western, has resigned, and has been succeeded by Mr. George B. Ross, who formerly held that position. Mr. Murphy is a brother of Mr. William J. Murphy, late General Superintendeat of the road.

—Mr. C. W. Buchholz, Civil Engineer of the New York, Lake Erie & Western, has been appointed one of the three experts who are to investigate and report upon the plans for improving the terminal facilities of the New York and Brooklyn suspension bridge. Mr. Samuel Spencer, of Drexel, Morgan & Co., and formerly President of the Baltimore & Ohio, has been appointed a member of the board by the Mayor of New York City. The third member has not yet been appointed.

—The appointment of Mr. W. F. Merrill to be General Manager of the Chicago, Burlington & Quincy, to succeed Mr. E. P. Ripley, has apparently been decided upon, but the official announcement has not yet been made. Mr. Merrill is at present General Manager of the Kansas City, St. Joseph, & Council Bluffs, and the Hannibal & St. Joseph roads, a position which he has held for the last three years. He was previously Superintendent of the Iowa and Missouri Lines of the Chicago, Burlington & Quincy, for four years. Mr. Merril has also been General Superintendent of the Toledo Peoria & Western, Division Superintendent and Assistant General Superintendent of the Wabash, St. Louis & Pacific, and General Superintendent of the Chicago, Burlington & Quincy.

ELECTIONS AND APPOINTMENTS.

Buffalo Dock & Connecting Co.—Among the Buffalo directors of this company are: Albert G. Hatch, Henry W. Box, Philo D. Beard, James Adams, H. D. Kirkover and John C. Sheehan; Cornelius J. Ryan, Baltimore, is also a director.

Chicago, Burlington & Northern.—At the annual meeting of the road held at La Crosse, Wis., June 11, the following directors were elected: Alexander Cochrane, J. Murray Forbes, George P. Gardner, W. Powell Mason, Edward C. Perkins, Nathaniel H. Stone and Charles L. Young.

Chicago, Burlington & Quincy.—W. C. Brown, Superintendent of the lines in Iowa and Missouri, has been appointed General Manager of the Hannibal & St. Joseph, and the Kansas City, St. Joseph & Council Bluffs lines. W. F. Merrill, General Manager of the Kansas City, St. Joseph & Council Bluffs, has been appointed General Manager of the Chicago, Burlington & Quincy, to succeed E. P. Ripley.

Chicago, Kansas City & Texas.—The stockholdsrs of the road met at Kansas City, Mo., June 12, and elected the following directors: W. E. Winner, A. M. Winner, Fred. W. Perkins, O. B. Copeland, Francis Amory, J. H. Whitmore and C. A. Peabody. The directors elected officers as follows: President, Willard E. Winner; Vice-President, Frederick W. Perkins; Treasurer, O. B. Copeland, and Secretary, C. A. Peabody.

Chicago, Kansas & Nebraska.—The annual meeting was held in Topeka, Kan., June 11. The following directors were elected for the ensuing year: C. F. Jilson, H. A. Parker, G. W. Samuels, Samuel T. Howe, P. J. Bonebrake, J. B. Bartholomew and M. A. Low. The directors elected the following officers: President, M. A. Low; Vice-President and Chief Engineer, H. A. Parker; Secretary and Treasurer, C. F. Jilson.

Chicago & Northwestern.—W. A Gardner has been appointed Superintendent of the Wisconsin division of the road vice E. J. Cuyler, resigned. J. C. Stewart has been appointed Assistant Superintendent of the Wisconsin division vice W. A. Gardner, promoted.

Cincinnati, Hamilton & Dayton.—The annual meeting of the stockholders was held in Cincinnati, June 17. Charles W. Fairbanks, of Indianapolis; William A. Proctor, of Cincinnati, and Henry E. Shoemaker were elected directors to succeed Julius Dexter, Russell Sage and Sidney Dillon. A resolution was adopted authorizing the directors to divide the board into three classes, one class to serve one year, one two years and one three years, so that only three directors will be elected each year. The by-laws were also changed so as to have devolve on the president most of the duties heretofore discharged by the vice-president. The board now stands as follows: M. D. Woodford, Alfred Sully and H. T. Shoemaker, three years; C. W. Fairbanks, Eugene Zimmerman and M. C. Martin, two years; E. E. Cole, George W. Davis and W. A. Proctor, one year. Vice-President M. D. Woodford was elected President, with the duties of General Manager, and Eugene Zimmerman Vice-President.

Croton Valley.—The following are the officers of this road: President, Cecil C. Higgins; Secretary and Treasurer, Isaac Aaron, both of 48 Wall street, New York City; Chief Engineer, Thomas L. Moore, 224 West Twenty-fourth street, New York City; and General Manager, Frederick Knowland, Plainfield, N. J.

Denver & Rio Grande.—E. P. Black, General Live Stock Agent, having resigned, F. S. Rockwell, Traveling Freight Agent, has been appointed to succeed him.

Dunkirk, Allegheny Valley & Pittsburgh.—At the meetings of the Board of Directors of the company, held May 21 and May 28, the following officers were elected: Chauncey M. Depew, President; H. Walter Webb, Vice-President; Edward V. W. Rossiter, Treasurer, and Dwight W. Pardee, Secretary. J. D. Layng, General Manager of the West Shore, will, until otherwise ordered, have temporary charge of the traffic and transportation matters of the road, and John Carstenson, Comptroller New York Central & Hudson River road, will have charge of the accounts on the road.

Gauley & Twenty Mile.—The incorporators are: M. A. Chenney, H. T. Chenney, L. D. Chenney, D. E. Chenney and F. O. Havener, all of Kanawha Falls, W. Va.

Illinois Central.—G. H. Stearns has been appointed General Eastern Agent of this road, with office in New York City, to succeed the late John J. Sproul.

Kentucky Midland.—George B. Harper, formerly General Superintendent of the Cincinnati & Green River and the Kentucky & South Atlantic, has been appointed General Manager of this road, with office at Frankfort, Ky., to succeed W. F. Dandridge, resigned.

Logan & Fairview.—The following are the incorporators of this company and of the Chaterawha & Guyandotte and Warfield & Big Sandy, extensions of the Norfolk & Western: F. J. Kimball, President of the Norfolk & Western; Joseph T. Daran, President of the West Virginia & Ironton road; W. C. Bullitt, of Philadelphia; Joseph S. Miller and W. W. Coe, Chief Engineer of the Norfolk & Western.

Louisville, New Albany & Chicago.—At a meeting of the directors of the company held in New York last week, N. W. Bumstead, of Boston, was elected a director in place of George W. Hutchings, and Hiram W. Hunt was elected Second Vice-President.

Manhattan, Newton & Gulf.—The directors of this Kansas road are: A. W. Williams, Topeka; S. R. Peters, E. H. Hoag, S. D. Williams, John C. Johnston, Newton; Frank Doster, Marion; S. M. Fox, Manhattan. The principal office will be at Newton, Kan.

Manitou & Pike's Peak.—H. S. Cable has been appointed Manager of this road.

Mobile & Ohio.—J. N. Seale, Assistant Superintendent, has been appointed Division Superintendent of the road between Okalona, Miss,, and East Cairo, Ky., with headquarters at Jackson, Tenn.

Milwaukee, Lake Shore & Western.—At the annual meeting of the company, held at Milwaukee, Wis.,

June 11, the following directors were re-elected: Joseph R. Busk, F. F. Thompson, New York; Charles Luling, Manitowoc, Wis., and Theodore M. Davis, Newport, R. I.

Morristown & Cumberland Gap.—The following are the officers of this North Carolina company: President, Col. J. G. Martin, Asheville, N. C.; Vice-President, F. H. Allison; Secretary and Treasurer, W. E. Scarritt, and Chief Engineer, C. J. Allison, Morristown, Tenn.

New York Central & Hudson River.—Archibald A. Schenck, formerly Chief Engineer of the Oregon Pacific, is now Chief Assistant Engineer of this company, with office at the Grand Central Station, New York City.

New York, Lake Erie & Western.—A. A. Gillis, of the Elmira shops, has been appointed Master Mechanic of the Delaware division of the road.

Oregon Railway & Navigation Co.—D. W. C. Perry, formerly Chief Engineer of the Kansas City & Pacific, is at present Assistant Superintendent of the Oregon Division of this company.

Pacific, Chehalis & Eastern.—The following officers were recently elected at a meeting at Chehalis, Wash.: Herman Trott, President; John A. Chandler, Vice-President; Daniel C. Wilt, Secretary, and John Dobson, Treasurer.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The following are the directors of the consolidated company: George B. Roberts, J. N. DuBarry, Frank Thomson, W. A. Patton and John P. Green, Philadelphia; William L. Scott, Erie; Alfred L. Dennis, Newark, N. J.; Samuel O. Pickens, Indianapolis, Ind.; J. N. McCullough, James McCrea and Thomas Messler, Pittsburgh; Robert Sherrard, Steubenville, O.; George Willard, Chicago. The following are officers: George B. Roberts, President; J. N. McCullough, First Vice-President; James McCrea, Second Vice-President; Thomas D. Messler, Third Vice-President; S. B. Liggett, Secretary, Pittsburgh; John E. Davidson, Treasurer, Pittsburgh.

Priceville & Winton.—The incorporators of this Pennsylvania road are: Simon Borg, New York City, President; Edward N. Willard, Frederick W. Mason, Jr., Elma H. Lawall and Everett Warren, Scranton, Pa.; J. P. Rafferty, Brick Church, N. J., and Richard C. Shimeall, Brooklyn, N. Y.

Rock Island & Peoria.—The stockholders of the road held a meeting at Rock Island, Ill., June 10, and elected as directors R. R. Cable, Geo. W. Cable, H. B. Ludlow and Geo. W. Dows, Jr.

Salt Lake & Bountiful.—The projectors of this Utah road are H. Bamberger, H. M. McCartney, of the Union Pacific; Mr. Hamilton, of St. Louis; Herman Hill and M. R. Evans, of Salt Lake City.

Seattle, Lake Shore & Eastern.—A. S. Dunham, Managing Trustee and Treasurer of the road, was elected President at a meeting of the trustees held in New York city recently.

Shenandoah Valley.—D. W. Flickwir, Superintendent, having resigned, Thomas H. Bransford, Auditor of the company, will be appointed to the position.

Sherman & Northwestern.—The directors of this Texas company are: W. A. Thomas, T. Randolph, O. T. Lyon, A. W. Byers, J. D. Joiner, W. C. Eubank, M. Schneider, J. P. Harrison and C. A. Andrews, of Sherman, Tex.

Shore Line.—The stockholders of the road have elected directors as follows for the ensuing year: Charles G. Landon, New York; William T. Bartlett, Wilbur F. Day, Henry L. Hotchkiss, E. H. Trowbridge and Arthur L. Osborne.

Smithsonia & Dunlap.—The directors have elected Col. James M. Smith, President, C. A. Stephens, Treasurer, and Frank Howard, Secretary. The office is at Smithsonia, Oglethorpe County, Ga.

Union Pacific.—W. W. Riter having resigned as Superintendent of the Utah Division, F. L. Corwin, Assistant Superintendent of the Wyoming Division at Green River, has been appointed Superintendent, with office at Salt Lake City. R. T. Hilliard, formerly Trainmaster, has been appointed Assistant Superintendent, with office at Green River, Utah, vice F. L. Corwin, promoted.

J. O. Brinkerhoff, Superintendent of the Kansas Division, has been appointed General Manager of the Missouri Division, with office at Omaha, Neb., to succeed E. Dickinson, resigned.

G. W. Balch has been appointed Superintendent of the Tacoma & Lake City R. R. & Navigation Co., with headquarters at Tacoma, Wash., reporting to H. V. Gates, Resident Engineer, Portland, Ore.

Weatherford, Mineral Wells & Northwestern.—The annual meeting of the stockholders of the road was held at Weatherford, Tex., June 16, and the following directors were elected: T. R. and W. S. Stone, Paul Forweig, Henry Warren, Geo. A. McCall and W. T. Ivey, of Weatherford. The directors elected the following officers: T. R. Stone, President; Henry Warren, Treasurer, and Paul Forweig, Secretary.

Wisconsin Central.—James McNaughton, formerly Assistant General Master Mechanic of the Northern Pacific, with headquarters at Livingston, has been appointed Superintendent of Machinery, with headquarters at Waukesha, Wis., to succeed John Player, resigned.

Wisconsin, Minnesota & Pacific.—At the recent annual meeting the old directors were re-elected and the following officers: President, L. C. Mitchell; Vice-President, T. E. Clarke; Secretary, Howard Abott; Treasurer, Joseph Gaskell.

Wyoming & Eastern.—The directors elected at the annual meeting of the company held at Cheyenne, Wyo. Ter., June 11, were: Millard R. Jones, David McKenzie, E. H. Stone, T. W. Tomlinson and W. B. D. James. M. R. Jones, President; D. McKenzie, Vice-President; J. W. Tomlinson, Secretary, and E. H. Stone, Treasurer.

The Wyoming & Pacific Improvement Co. elected: Wendell Goodwin, President; C. E. Gedney, Vice-President, and Amos T. French, Secretary and Treasurer.

RAILROAD CONSTRUCTION,

Incorporations, Surveys, Etc.

Augusta & West Florida.—A new construction company has been formed to continue the construction of this line, and to succeed the old company, of which Jesse Thompson, of Augusta, was President. William Bailey, of New York City, and T. J. James, of Atlanta, are the principal directors of the new company. It is stated that the bonds for building the first section of the line have been placed in New York City through James U. Jackson, of Augusta. The road is projected to extend from Augusta to Thomasville, Ga., about 230 miles, and the grading is now in progress on the 53 miles from Augusta.

Belleville, Centralia & Eastern.—The tracklaying on this extension of the Louisville, Evansville & St. Louis, from Mt. Vernon to Belleville, Ill., 72 miles, was completed last week, the connection being made near Belleville. Passenger trains will probably be put on early in July.

Brackett, Fort Clarke & Rio Grande.—The stock owned by Haines Bros., amounting to about $60,000, has been purchased by the other stockholders in the company, and a new contract will probably soon be awarded for grading the road from Brackett south to Spofford Junction, Tex. B. H. Gardner, of Limestone County, has been elected President.

Butte City, National Park & Southwestern.—The articles of incorporation of this company were filed in Montana recently. The company proposes to build a road from Butte southwesterly through Blacktail, Deer Creek and Pipestone Pass to the Jefferson Valley, thence by way of Jefferson and Ruby valleys to Ennis, in Madison Valley.

Camden & Alexandria.—The locating survey, which was begun May 26, is now about completed between Camden and El Dorado, Ark., a distance of about 31 miles. The preliminary surveys were made during March and April. The company expects to begin the construction of the line between Camden and El Dorado as soon as the locating survey has been completed.

Central New England & Western.—A number of manufacturers of Poquonnock, Conn., have petitioned this company to build a branch of its line from a point near Bloomfield, northeast to Poquonnock, about three miles.

Chandler Creek.—This road is being built along Chandler Creek to a connection with the Denver & Rio Grande at Florence, Colo. The grading has been finished and the bridges erected. The track-laying is now in progress and will probably be completed by July 1. The road is being constructed by a coal company which owns mines at Chandler Creek.

Chaterawha & Guyandotte.—The charter of this company was filed in West Virginia this week by the officers of the Norfolk & Western. The road is to extend from a point on the Ohio extension of the Norfolk & Western up the valley of the Guyandotte River. The line will be over 150 miles long.

Choctaw Coal & Railway Co.—It is expected that the road will be completed east from McAlester, Ind. Ter., to Wister, on the St. Louis & San Francisco, about July 1. Going west, the line will cross the Chicago, Rock Island & Pacific at El Reno, following thence west on parallel 35° through Henrietta county, Tex., on the original survey of the Atlantic and Pacific to Albuquerque. The road will also probably be extended from Hawthorne to Denison.

Corpus Christi & South America.—Two surveying parties are now in the field between Corpus Christi and Brownsville, Tex., on the Rio Grand River, a distance of 150 miles. One party is on the preliminary survey and has finished about 100 miles. The other has commenced on the location. The bids will be received in about a month for a portion of the work.

The surveys are being made by J. J. Cocke, of Brownsville. Two routes are proposed, one south from Corpus Christi, near Aransas Pass, through the countries of Neuces, Cameron and Hidalgo, along the coast of the Gulf of Mexico to Brownsville; the second from Corpus Christi west to the Rio Grande River, and southeasterly along that river through Rio Grande City and Hidalgo to Brownsville. The sum of $125,000 has been subscribed by landowners in aid of the project, and the balance needed to build the road will probably be subscribed by the Port Aransas Co., whose stockholders are also interested in the railroad. E. H. Ropes, of Corpus Christi, President of the latter company, is also President of the railroad. D. J. Thayer is Chief Engineer and S. H. Mallory is General Manager.

Corsicana & Southeastern.—The surveys have been completed from Corsicana through Fairfield and Freestone county to a point on the International & Great Northern, ten miles south of Fairfield, Tex. The distance from Corsicana to the southern terminus is 50 miles.

Croton Valley.—It is stated that the contracts for building this road will be let during July. The locating survey has been made for the entire road. It is to extend from Croton Point, Westchester County, N. Y., on the Hudson River, through Westchester County to the state line between New York and Connecticut, near Ridgefield, Conn., a distance of about 25 miles. The line will cross the New York Central & Hudson River road and the New York & Northern at Kitchawan, and the New York & Harlem at Mt. Kisco. It will probably be placed under construction during the summer. The maximum grade is 52 ft. to the mile and the maximum curve is 7½ degrees. F. Knowland, of Plainfield, N. J., is General Manager. T. L. Moore, 224 West 24th street, New York City, is Chief Engineer. The New York office is at 48 Wall street.

Cumberland & Kentucky.—A charter was recently granted by the Kentucky Legislature to this company for the construction of a road from Frankfort through Anderson, Washington, Marion, Taylor, Green, Adair and Cumberland counties, to the Tennessee line. The company was recently organized at a meeting in Frankfort, Ky., by the election of the following officers: Z. F. Smith, President; E. H. Taylor, Jr., Vice-President; John W. Rodman, Secretary; J. C. Fawcett, Treasurer; William McCloy, Chief Engineer.

Delaware River & Lancaster.—The cross ties and rails have been delivered for the entire line between St. Peters, on the Wilmington & Northern, easterly, and Kimberton, Pa., on the Philadelphia & Reading, a distance of 11½ miles. Tracklaying has already been completed on the first two miles of the western section from St. Peters to Coventry. It is expected to have about eight miles of the tracklaying finished early in July, but the entire line will not be completed until some time in August. All the grading is at present completed with the exception of about three-quarters of a mile near the connection with the Philadelphia & Reading at Kimberton, and there are also three bridges which must be erected across the French Creek, work upon which has not yet commenced. The line has been located to Lancaster, 36 miles beyond St. Peters, but the road is not yet under contract beyond Kimberton. H. R. M. Whitman is Chief Engineer.

Duluth, Crookston & Northern.—The company has commenced grading on an extension of its line from Crookston, Minn., northwesterly to Keystone, a distance of 16 miles. E. C. Long & Co., of St. Paul, have the contract. It is proposed to extend the line beyond Keystone to Brayton, N. D., a distance of 20 miles. The road is operated by the Northern Pacific, and connections will be made with that line at Keystone and at Drayton.

Duluth & Winnipeg.—The grading has been completed on the first 30 miles from La Prairie, Minn., northwest, and 1,000 men are reported at work on the extension to Red Lake and the international boundary. The Pennsylvania Steel Co. is rolling the rails and has already shipped part of the order. This lot is expected to reach Duluth this week, and tracklaying will probably begin this month at La Prairie. The locating engineers state that there will be no difficulty from the deep swamps south of the Mississippi river and west of Itasca. The road between Cloquet, Grand Rapids and La Prairie is being ballasted and surfaced, and this work has been completed on 25 miles of the distance.

Easton & Northern.—This company proposes to build a road from Easton, Md., in a northerly direction. The capital stock is $800,000. E. L. F. Hardcastle, George R. Goldsborough, Hedge Thompson, W. McKenney, James Brown, W. S. Walker, C. T. Westcott and others are the incorporators.

Empire & Dublin.—The contract for grading the extension from Hawkinsville east to Grovonia, Ga., on the Georgia, Florida & Southern, a distance of 13 miles, has been let to Patrick Keilly, of 11 Cornelia street, Atlanta, Ga. The location has been made, and the grading will be completed as soon as possible. The work is light, the material averaging about 8,000 yards of excavation per mile, mostly through sand clay. The maximum grade is 100 ft. per mile, and the maximum curve is two degrees. The road is being built by the Empire Lumber Co., of Chattanooga. The line at present extends from Dublin through Empire to Hawkinsville, a distance of 40 miles.

Fairhaven & Southern.—The draw bridge over the Nooksack River is now being erected, and tracklaying is in progress between Ferndale and Fairhaven, Wash. The line will probably be opened between these points July 4.

Florida Midland.—J. H. Dawe, of Boston, Mass., has the contract for the extension of this line from Harpersville to Kissimmee, Fla., 14 miles, and the first nine miles from Harpersville south have been completed.

Fort Worth & Rio Grande.—Grading is making rapid progress on the extension from Dublin to Comanche, Tex., a distance of 22 miles, and surveys are being made from Comanche to Brady and to Mullen. Griffin Bros., of Dublin, have the contract for grading between Dublin and the Comanche County line, five miles, and Martin Byrne & Johnston, of Comanche, have the contract for the line from the Erath County line to Comanche, a distance of 17 miles.

French Broad Valley.—The sub-contracts on this road from Asheville, N. C., to Hendersonville, a distance of 46 miles, have been let to A. B. Fortune, J. D. Hardin and Copening & Lewis, all of Hendersonville, N. C. The contract has been divided into two sections from Asheville to the Transylvania County line, 27 miles, and from the Broad River to Hendersonville, 19½ miles.

Ganley & Twenty Mile.—The Secretary of State of West Virginia has chartered this company to build from Belva, Nicholas County, up Twenty Mile Creek to Summersville, and thence up Bell Creek to a point at or near the mouth of Blue Creek in this county. F. O. Hevener, of Kanawha Falls, is an incorporator.

Henderson Belt Line.—Peter Manion has been awarded a contract for building this road between Henderson and Audibon, Ky.

Lehigh & Hudson River.—The grades at Belvidere, Townsburg and New Milford, N. J., are to be reduced from a maximum of 53 ft. to the mile to a maximum of 37 ft. to the mile.

Lehigh Valley.—Some of the Philadelphia papers publish an interview with J. G. Tait, Assistant Engineer, regarding the surveys for the Philadelphia extension. Mr. Tait is quoted as saying that the surveys begin at Conshohocken and go some distance west of Doylestown, that being deemed the most direct route. Other lines have been run, but without any idea that they would be adopted. A route has also been surveyed from Philadelphia to New Hope and across the Delaware to Ringoes. This has been done merely to furnish the company with information, and as a completion to previous surveys and maps, and not with the idea of beginning a new Philadelphia and New York line over that route. The actual route as surveyed will not be more than a mile or two longer than the Bound Brook route, and is the most direct to New York other than that route. An air line between Philadelphia and New York would strike between the two routes, but the necessary gradings and tunnelings would be insuperable objections.

Lexington & Eastern.—This company has been recently organized in Kentucky to construct a road through Pike, Knott, Knox, Perry, Letcher and Leslie counties. J. H. Crossman and Arthur Macy, of New York City, are interested.

Logan & Fairview.—This company has been incorporated in West Virginia to build a branch of the Norfolk & Western through Logan County following Twelve Pole River.

Louisville & Nashville.—The grading on the branch from Clarksville to Dickson, Tenn., on the Nashville, Chattanooga & St. Louis, about 31 miles, is to be commenced at Contrary Pond, near Dickson, as soon as the first five miles has been located. The ten miles from Contrary Pond north to the property of the Cumberland Furnace Co. will be the first section constructed and put in operation, as the firm promises the road 300 tons of freight daily. The first ten miles from Allens Switch near Clarksville south is the most difficult part of the line.

Lynchburg & Durham.—A deed of trust for $3,000,000 from this company has been filed at Lynchburg, Va., to secure funds for the completion and extension of the road.

Manhattan, Newton & Gulf.—The articles of incorporation of this company were filed in Kansas last week. The company proposes to build a road from Manhattan in a southwesterly direction through the counties of Geare, Dickinson, Morris, Marion, Chase, McPherson, Harvey, Reno, Sedgwick, Kingman, Sumner, Harper and Barber, to the south line of Kansas. The capital stock is $4,500,000.

Mexican Roads.—The terms under which the government has granted a concession to Gen. Herman Sturm, of Indianapolis, for building a road from the City of Mexico to Cuernavaca, thence along the borders of the states of Guerrero, Puebla and Oaxaca to Tecoanapa Bar in the Pacific, and along the coast as far as Palliada, have just been made public. The survey has to be commenced with six months and the construction within eighteen months after the plans of the route are approved by the government. Within two years ten kilometres of the road must be finished, and the road must be completed in ten years. All mines, salt deposits and marble quarries discovered in excavating belong to the concessionaire for 15 years. The concession is given without a subsidy, but a free right of way is granted through all public lands belonging to the government.

The location of the line known as the Laguna road has just been completed by C. E. Patterson and Marshall Miller. The road leaves the Mexican International at Hornos, and extends northwestwardly to the Nazas River, thence northeastwardly to San Pedro de Laguna. The section from Hornos to San Pedro will be 16 miles long, and will be an easily constructed road, the maximum grade being less than one per cent.

Middle & East Tennessee.—The arrangements have been nearly completed for securing the entire right of way from Gallatin southeast to Hartsville, Tenn., a distance of 15 miles, and it is expected that the construction will be commenced in a few days. J. C. Rodemer, of Gallatin, has the contract.

Midland Pacific.—The preliminary survey between Sioux Falls and Pierre, S. D., 221 miles, has been finished, and the cross-sectioning will begin at once. J. G. Barton is Chief Engineer.

Montgomery, Tuscaloosa & Memphis.—The grading has been completed on the first 50 miles from Montgomery to Maplesville Ala., and grading has been commenced on the next 50-mile section, from Maplesville through Centerville to Tuscaloosa. The road connects at Maplesville with the East Tennessee, Virginia & Georgia, and the new road will parallel that line for about four miles from Maplesville, leaving it at a point near Randolph. James M. Brown & Co., 115 Broadway, New York City, are the contractors. Dean, Berry, Bohman & Co. have the sub contract.

Morristown & Cumberland Gap.—The grading on this line is to be commenced at Morristown on June 24. The contract was let some time ago to Allison, Shafer & Co., of Chattanooga, and that firm is now letting the subcontracts. These will probably be all awarded by June 24. Surveys are still being made, but they have been completed on most of the line. The work is generally heavy with maximum grades of 1.5 per cent. and maximum curves of eight degrees. There will be one bridge 375 ft. high. The road is to extend from Morristown, Tenn., to Cumberland Gap. C. J. Allison, of Morristown, is Chief Engineer.

New Orleans & Northwestern.—The track and roadbed of this line were seriously damaged during the recent overflow of the Mississippi River, but the road has since been repaired and tracklaying will be resumed this week from Rayville, La., south, and from the Tensas River north. The tracklaying at present has been completed from Vidalia northwest to the Tensas River, a distance of 16 miles, and the grading has been finished to Rayville, 40 miles beyond. A survey is now being made to Hamburg, Ark., 40 miles from Rayville. The National Construction Co., of St. Louis, has the contract for building the line. W. D. Jenkins, of Natchez, Miss., is Chief Engineer.

New Roads.—The following railroad grant bills passed the United States Senate this week: The Senate bill granting to the Jacksonville, St. Augustine & Halifax a right of way across the United States military reservation at St. Augustine, Fla.; the House bill granting the right of way to the Duluth & Manitoba across the Fort Pembina reservation in North Dakota; the House bill to grant the right of way through the Indian Territory to the Pittsburgh, Columbus & Fort Smith.

The survey is being made for a road from Calvert, Tex., southwesterly down the Brazos Valley to Mumford, a distance of about 30 miles, crossing the International & Great Northern at Lewis. W. J. Crocker, of Dallas, is Chief Engineer.

H. T. Reynolds, of Springfield, Utah, is building a road from Thistle, on the Rio Grande Western, south a distance of about 30 miles to Fairview, San Pete County, Utah. About 300 teams and 500 men are grading in Thistle Cañon.

Engineers are surveying a line from Elkins, on the West Virginia Central & Pittsburgh, to Bellington, W. Va.

Northern Pacific.—The Northern Pacific & Montana extension from Logan to Butte, Mont., has been completed and was turned over to the operating department June 14. By the completion of the line Butte is brought 104 miles nearer St. Paul. The completion of the Little Falls cut-off, some months ago, further shortened the line 26 miles, which now makes the distance from St. Paul, via the Northern Pacific, 130 miles less than it was a year ago. The stations opened on the new line are Three Forks, Willow Creek, Sappington, Jefferson, Bar, Jefferson Island, Whitehall, Pipestone Springs, Spire Rock, Beef Straight, Spur, Lewis Spur, Homestake, West Tunnel Siding, East Butte and Montana Union Transfer.

President Oakes has informed a committee of citizens of Helena, Mont., that the company will build a road to Castle from Helena, via Townsend if it is possible to secure a route from that point. He is waiting the engineer's report.

On the line from Missoula, Mont., to Mullan, Idaho, 140 miles, the tracklaying has been finished for some distance west of Missoula, and is now in active progress, over a mile of road being completed each day.

Orange & Keysville.—The Buckingham Construction Co., which has the contract for building this Virginia road, has been recently reorganized, and it is stated that arrangements have been made by which the company will be enabled to resume grading with a large force. J. J. Granville, of Baltimore, has been elected President to succeed Thomas Moore, and W. A. Dafty has been elected Chief Engineer and Superintendent. John Goodwin, of Baltimore, has been elected President to succeed Robert T. Hubbard.

Oregon & Washington Territory.—G. W. Hunt is said to have 200 teams and 500 men working on the division from Centralia to Grays Harbor, Wash., 57 miles.

Pendleton, Lookout & East Walnut Hills.—The company has been incorporated in Ohio with a capital stock of $100,000. The company proposes to build a road between Cincinnati and Hamilton.

Pennsylvania.—At a recent meeting of the select branch of City Councils, Reading, Pa., the two ordinances granting the Pennsylvania permission to build a freight branch through the northwestetn section of the city to reach industrial establishments were defeated by a vote of 10 to 2. During the argument of the counsel for the company, he stated that that company had surveyed a line from Reading to Lebanon, a distance of 28 miles, another branch from Reading to Mohnsville, and that it is now surveying a third line from Reading to Allentown, along the Philadelphia & Reading Co.'s East Pennsylvania Branch.

Philadelphia, Newtown & New York.—A special meeting of the stockholders has been called for July 15, at Norristown, Pa., to vote on a proposition to increase the capital stock of the railroad from $1,200,000 to $2,000,000, and to provide for an issue of additional bonds. The object is to secure funds for a short extension of the road to a connection with the tracks of the Bound Brook Road near Logan Station, so that trains can come into Ninth and Green streets, Philadelphia, instead of into Third and Berks streets. The proposed extension will be about a mile long. The road is controlled by the Philadelphia & Reading.

Philadelphia & Sea Shore.—The tracklaying has been completed from Winslow Junction to Tuckahoe, N. J., about 10 miles north of Sea Isle City. It is expected to have the track laid to the latter city by July 1.

Phillips & Rangeley.—W. Brown & Bro., who have the contract for grading this narrow gauge line between Phillips and Rangely, Me., began work on the road June 10 at Redington Mills.

Pittsburgh, Chicago & Western.—This company was incorporated in Ohio June 17 to build a road from a point on the Ohio River, in Jefferson County, and thence west through the counties of Jefferson, Carroll, Harrison, Tuscarawas, Coshocton, Holmes, Knox, Ashland, Richland, Morrow, Crawford, Marion, Hardin, Arylaize, Allen and Mercer, to the Indiana line. The incorporators are Adam Linn, Hudson P. Rose, A. E. Kendall, W. S. Bates and F. H. Wright.

Princeville & Winton.—The company has been incorporated in Pennsylvania by officers of the New York, Susquehanna & Western to build a road beginning at a point on the Winton branch of the Delaware, Lackawanna & Western, south of the Lackawanna River, thence to a northerly and westerly direction through the boroughs of Winton, Blakely and Dickson City to a point north of the public road, between Scranton to Carbondale. The length of the line is about four miles, and the capital stock is $50,000. Simon Borg, New York City, is President.

Ravenswood, Spencer & Glenville.—The contract was let last week at Parkersburg to Stanley & Oulds for the grading of this road, which is to be built from Ravenswood to Spencer and Glenville, W. Va., and operated by the Ohio River road. The contract includes all the grading and timber and bridging except a steel bridge over Sand Creek.

Rio Grande Junction.—Work is practically suspended on the road from New Castle to Grand Junction, Colo. It was announced that the road would be completed and ready for operation by June 15, but it will probably be two or three months after that time before it will be finished. The line is to be operated jointly by the Colorado Midland and the Denver & Rio Grande, but the construction work has been done by the latter company. The local papers state that, as the standard gauge road of the Denver & Rio Grande will not be in operation for some months, it is not disposed to hurry the construction of the Rio Grande Junction line.

Rio Grande Southern.—The grading is completed from Ridgway, Col., to the summit of the divide between the Dallas and the San Miguel, except a small portion that is now being finished. Ties are distributed along 10 miles and tracklaying will soon be pushed with vigor. Some delay will occur while a high bridge across a branch of Dallas Creek is being erected; after that is erected the track will soon reach Telluride. The grading is in progress on the first 31 miles from Dallas.

Rio Grande Western.—Standard gauge trains were put on between Ogden and Grand Junction, June 15. An officer states that the work of changing the line to standard gauge has cost something like $1,500,000, but it will be a profitable improvement, to say nothing of the necessity for it. The line between Grand Junction and Salt Lake City is shortened about 20 miles. The curves are reduced from 16 degrees to 12 degrees and less. These improvements will enable trains to increase their speed by fully two hours between Grand Junction and Salt Lake.

The company may build a new line from Springville to the large mines in Tintic, Colo., a distance of about 30 miles. This route is through a good country, and will give the mining interests in the Tintic district the benefit of a competing line.

Rockport, Langdon & Northern.—The tracklaying is to be commenced this week between Rockport and Langdon, Mo., six miles. Haines Bros., of Rockport, Mo., have the contract.

Salt Lake & Bountiful.—The survey for this road, which is to extend from Warm Springs south through Hot Springs to Bountiful, Utah, a distance of eight miles, is now being made. S. Bamberger, of Salt Lake City, is President.

Saranac & Lake Placid.—This road has been incorporated in New York with a capital stock of $100,000. The road is to extend from the southerly terminus of the Chateaugay road in Harrietstown, Franklin County, to Lake Placid, a distance of 10 miles. Among the incorporators are Smith M. Weed, Legrand B. Cannon, Geo. S. Weed and Alvin L. Inman.

Seattle & Montana.—The preliminary surveys have been completed on the western division for about 150 miles from Seattle, and the 40 miles is now being located. When this work is finished it is reported that the contracts for grading the section will be awarded. W. P. Watson, of Seattle, is Resident Engineer.

Seattle & Northern.—Tracklaying on the road has been completed to Burlington, a point about 18 miles east of Anacortes, Wash. Grading is in progress east from this point.

Shelby Iron Co.—It is stated that the Shelby Iron Works, of Shelby, Ala., which owns this road, will extend it westerly from Shelby to Calera, Ala., on the Louisville & Nashville. The extension will be about 10 miles long.

Sherman, Denison & Dallas.—Grading was commenced on this road at Sherman, Tex., June 14. It is to be operated by the Missouri, Kansas & Texas, when completed.

Sherman & Northeastern.—This company has been incorporated in Texas to build the road from Sherman, Tex., to Ardmore, I. T., on the Atchison, Topeka & Santa Fe, a distance of 53½ miles, for which surveys were made last April. W. A. Thomas and O. T. Lyon, of Sherman, are Directors.

Sioux City Terminal Railway & Warehouse Co.—This company is now engaged in laying out terminal yards at Sioux City, Ia., which, when completed, will be used by the Sioux City & Northern. The Pacific Short Line will also use the yards, and the company expects that some of the other roads which reach Sioux City will make use of the facilities, as the yards of the older roads are now very generally overcrowded and the new terminal grounds are so arranged that they are easy of access to any of the roads entering the city. The yards will have room for 25 miles of track, and the company is at present laying 15 miles of track. There will also be built a large passenger station and train sheds at a probable outlay of $300,000. A. K. Shurtleff is Chief Engineer.

Tallahassee Northern.—This company has been recently incorporated in Florida to build a road from Tallahassee north to the Georgia state line. The incorporators are: C. H. Bennett and R. L. Bennett, of Philadelphia, Pa.; George W. Sason, B. A. Meginnis and George Greenhow, of Tallahassee.

Two Town Railway & Navigation Co.—This company has been organized by Whittaker & Co., J. H. Draughon, J. H. Bemis and others of Texarkana, Tex., to build a road from Texarkana to a point on the Sulpher River near Bemis Mills, where connection will be made with New Orleans by river navigation. The length of the road will be about nine miles. The capital stock is $60,000.

Union Pacific.—President Adams states that during his recent visit to the Northwest it was determined to extend the line from Portland to Tacoma and Seattle at once, if the step is approved by the board of directors. Beside this line one or two short branches spurs to mining districts will be built. The company has no present intention of constructing a line into any part of California or of building to San Francisco. The only important extensions which the Union Pacific is now engaged in are the line to Pioche, 140 miles, and the one to Puget sound, 185 miles.

J. W. Smith has 100 teams and 200 men at work between Olympia and Tacoma, Wash., 185 miles, on the branch from Portland to Seattle, and a gang of 40 teams and 100 men are on the way to the same point. Work on the division between Portland and Kalama will be begun as soon as the location of the line is completed, and the right of way has been secured. The contractor has a large force working on the Port Townsend & Southern, and as soon as that contract is completed the men will be transferred to the Union Pacific. Work on the bridge across the Columbia at Vancouver will be begun soon. The company has obtained the franchise from the government, the bill having passed the House and the Senate. The bridge will cost over $1,000,000, and will be completed in 18 months.

Warfield & Big Sandy.—This company is one of three (the other two being the Chaterawha & Guyandotte and the Logan & Fairview) for which articles of incorporation were filed in West Virginia this week by the officers of the Norfolk & Western. The road is to be built along the valley of the Tug River, a tributary of the Big Sandy.

Western Maryland.—The ordinance authorizing the Western Maryland Tidewater Railroad Co. to construct a road over the bed of Jones Falls, and through Alice, Anna and Boston streets to the water front has passed the Baltimore City Council and has received the Mayor's approval. The company may decline to accept the ordinance as it objects to certain amendments added by the City Council.

West Virginia Central & Pittsburgh.—The company has proposed to the town council of Beverly, Randolph County, W. Va., that if the town will vote a cash subscription of $20,000 to the capital stock of the road, and furnish free right of way from Beverly to Davis, the company will build a line to Beverly this year.

Wheeling Bridge & Terminal Co.—The company has decided upon the location for its union station in Wheeling, W. Va. It will be built at Market street and Wheeling Creek fronting on Market street. A branch will be built from a point on the main line to the union station. Yards will be laid out along the north side of the Wheeling creek near the station. Retaining walls will also be built along the creek. In Martin's Ferry the company will build a single-track steel viaduct in the shape of the letter S, making an overhead crossing of the county road, Union street, and the tracks of the Cleveland & Pittsburgh and connecting with the Cleveland, Lorain & Wheeling and the Wheeling & Lake Erie near the Laughlin Steel Works. The contract for all the substructure work has been awarded to Paige, Carey & Co., 45 Broadway, New York City.

Wheeling & Elm Grove.—The company has opened the extension from Wheeling to Elm Grove, W. Va., four miles. It is reported that a further extension of five miles to Triadelphia, is under consideration.

Wichita Valley.—The road has been opened for operation from Wichita Falls south to Dundee, Tex., a distance of 28 miles. Work is now in progress on the section between Dundee and Seymour, 28 miles. Daniel Carey, of Fort Worth, has the contract for the work.

Winona & Southwestern.—D. Galligan, of Winona, Minn., has been awarded the contract for the grading on the extension of this road from Utica to Dover, Minn., about 11 miles. The company will let the contract this month for another section of 20 miles from Dover southwesterly toward Osage, Ia. C. M. Wheeler, of Winona, is Chief Engineer and Superintendent.

Wisconsin Central.—A branch is being built by the Glenwood Manufacturing Co. from a point four miles north of Glenwood, Wis., northeasterly a distance of 12 miles.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The election in Cumberland, Md., June 17, upon the question whether the city would loan $150,000 to the company for a stated period in consideration of the location of the shops at that point, and making the city the terminus of the second and third divisions and the Pittsburgh and Connellsville division, resulted in a large majority in favor of the proposition.

President Mayer states that the syndicate represented by E. R. Bacon, of New York, which has purchased the common stock held by the city of Baltimore, and the preferred stock held by the state of Maryland (the latter being subsequently exchanged for part of the common stock held by the Johns Hopkins University) represented the present stockholders of the company. All the directors representing the holdings of the state and city will resign, except two, who will vote the stock of the Washington Branch held by the state, and which a provision of the constitution forbids it to sell. The new directors of the company will represent the Richmond & West Point Terminal and other connecting lines. The directors of the latter company have appointed a committee to decide whether that part of the Baltimore & Ohio common stock purchased by the syndicate, which has been allotted to certain stockholders of the company, who are also members of the syndicate, shall be purchased by the company.

The statement of earnings made this week shows that the net increase as compared with the same month last year was $66,690, while for the eight months of the present fiscal year the net gain was $1,242,751. The summary of the entire system gives the earnings for the month at $2,005,539; increase, $258,222; expense, $1,460,532; increase, $191,532; net increase, $66,690. The earnings and expenses for the eight months of the fiscal year 1889-'90, compared with the same months of the last fiscal year, gives earnings of $15,884,481; increase, $2,504,299; expenses, $11,078,655; increase, $1,261,548; net increase, $1,242,751. During May the lines east of the Ohio River showed a net increase of $51,643, against $15,047 for the lines west of the Ohio.

Central of Georgia.—The earnings and expenses for April are shown in the following table:

Month of April.	1890.	1889.	Inc. or dec.
Earnings	$522,501	$499,216	+$53,284
Expenses	577,526	479,454	+ 97,975
Loss	$25,025	$19,661	—$44.687
Income from invest's	2,246	.....	+ 2.246
Net loss	$22,679	$19,661	—$42,440
Mileage	1,292	1,220	+ 78
Voyages	29	22	+ 7

The gross earnings for the ten months of the present fiscal year up to April 30 show an increase of $834,709.04.

Chautauqua Lake.—The road has suspended operations. The Superintendent explains that the company having met with unexpected embarrassment, it is compelled to stop the running of trains and to suspend all operations for the present.

Cincinnati, Hamilton & Dayton.—The annual report shows net earnings for the year ending March 31, 1890, of $1,400,915, an increase of $13,327. The total earnings for 1890 were $3,565,178, an increase of $86,203. The total operating expenses showed an increase of $71,790. It is explained that the comparison is not fair because it does not include in 1890 the operations of the Cincinnati, Richmond & Chicago, and a portion of the Cincinnati, Jackson & Mackinaw. If these had been included the gross earnings would be $200,000 greater. The President's report, speaking of the Ives and Stayner criminal trial, says: "The failure of justice in the case on trial in September is a source of regret, but the prosecution is still pending, and it is to be hoped that Stayner and Ives will yet be tried with a more satisfactory result than a disagreement of the jury. He says, further, of the question of the validity of the Ives and Stayner stock: "The suit involving the validity of the so-called preferred stock has not yet been reached in the court. Of the $10,000,000 of the alleged preferred stock issued by Ives & Co. there yet remain outstanding and claimed against your company $2,406,900. In retiring the portion that has thus far been taken in, the company has authorized and put out an issue of $553,600 preferred four per cent. stock."

Kansas City, Wyandotte & Northwestern.—It was rumored this week that Jay Gould had purchased the road from its present owners for about $650,000. The line is operated between Kansas City and Beatrice, Neb., 174 miles, with a branch to Carbondale, Kan., 45 miles, and to Fort Leavenworth, 16 miles.

New Brunswick.—The Canadian Pacific has secured control of this road, and will begin to operate it about July 1. The main line of the road extends from Gibson to Edmundston, N. B., a distance of 164 miles. There are leased lines extending from Aroostook to Presque Isle, Me., 30 miles; St. Andrews to Woodstock, 93 miles; St. John to St. Croix, 92 miles, and to other points, the mileage operated amounting to 452 miles.

Salisbury & Harvey.—Mr. Harmon, President of the National Improvement Co., of New York, and William Willis, of London, representing the English bondholders of the road, have about completed arrangements for the sale of the road for $70,000 to the American company. The latter has secured valuable manganese mines in Albert county, and the road will be operated to them.

Union Pacific.—The earnings for April and the four months to April 30 were as follows:

April, 1890.	Main lines and Centr'l Branch.	Lines ½ int.	Total.
Miles	7,955	92	8,047
Gross earnings	$3,638,970	$42,237	$3,681,207
Oper. expenses	2,597,332	48,982	2,646,314
Net earnings	$1,041,638	def $6,745	$1,034,893
April, 1889.			
Miles	7,762	92.46	7,854
Net earnings	$973.341	def $7,540	$96,580
Jan. 1 to April 30:			
1890—Miles	7,944	92	8,036
Gross earnings	$12,492,955	$145,361	$12,638,316
Oper. expenses	9,245,044	202,032	9,447,076
Net earnings	$3,247,912	def. $113,341	$3,191,241
1889—Miles	7,761	92	7,854
Gross earnings	$10,657,081	$119,168	$10,776,249
Oper. expenses	7,552,508	168,507	7,721,015
Net earnings	$3,104,573	def. $49,339	$3,055,23

Wabash.—The gross earnings and operating expenses of the company from July 1, 1889, to April 30, 1890, inclusive, being ten months of the fiscal year which ends June 30, 1890, were as follows: Gross earnings, $11,438,103; increase, $907,109; operating expenses, $8,117,456; decrease, $22,735; net earnings, $3,320,647; increase, $929,844. The fixed charges for the whole year amount to $3,300,000, including interest, taxes, and rentals. The Wabash has not only paid its fixed charges up to date, but has also paid $105,000, being a dividend of 3 per cent. on the debenture "A" preferred bonds, amounting to $3,500,000. The company has also paid out of net earnings $277,000 of interest, which accrued on the first and second mortgage bonds during May and June prior to the consolidation, which amount should have been provided from earnings of lines east of the Mississippi River, then in possession of Receiver McNulta.

Webster City & Southwestern.—Special execution was issued by the Clerk of the District Court at Ft. Dodge, Ia., last week for the sale of the road. The order is the result of the foreclosure proceedings instituted by the Crooked Creek road on a mechanic's lien for $81,737 held by the latter company, which operates the Crooked Creek road.

Western & Atlantic.—The Governor of Georgia has advertised for bids for the lease of the road, together with all its shops, rolling stock and other property until June 27. The road extends from Atlanta, Ga., to Chattanooga, Tenn., a distance of 138 miles. The lease is to be for a term of 20 years, and for $35,000 per month, or for 30 years, and for $40,000 per month; or for 50 years and for $45,000 per month—the rental to be paid monthly into the treasury of the state. The terms and conditions of the lease are to be in accordance with the provisions of an act of the General Assembly, providing for the lease of the road.

The governor has appointed G. Gunby Jordan, of Muscogee, John Scriven, of Chatham, and Eben Hillyer, of Floyd County a board of examiners, to make an examination and a report showing the condition of the roadbed at the time of the lease. Their work is to be made "within ten days of the time set for opening the bids." The state guarantees the property to be in as good condition at the time of the transfer (Dec. 27) as it is at the time the bids are submitted.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, June 18, 1890.

The Trans-Missouri Passenger Association held a meeting here June 13 to take action in regard to its amalgamation with the new Western Passenger Association. The Union Pacific and Missouri Pacific roads were not ready to transfer their business from the old to the new association until some pending matters had been arranged, and the meeting adjourned until June 19th, at which time it is expected no opposition will be made, and the remaining roads in the Trans-Missouri Association will withdraw and disband the association and become members of the new association. It is not understood that either line desires to obstruct the formation of the new association. The Western Passenger Association met June 16. Considerable routine business was transacted, but nothing was done about the Trans-Missouri members joining, as it was thought best to wait until after their meeting on Thursday.

The outlook for an immediate restoration of freight rates is not promising. Probably nothing in that direction can be accomplished until the close of navigation.

It is evident that the Lake Shore & Michigan Southern is determined to force the fighting on dressed beef rates until some satisfactory understanding is reached in regard to allowing the 3 cent differential to the Canadian lines. The Canadian lines put in effect a rate of 39 cents on dressed beef, Chicago to Boston, June 16, and the Lake Shore at once gave notice of a rate taking effect June 20 of 39 cents on dressed beef, mutton and hogs to New York, and 22½ cents on live cattle to New York and Boston. The Lake Shore claims the Grand Trunk has no right to apply the 3 cent differential on the present rates; also, that the Wabash (Canadian Pacific Despatch line) has no right to take the differential, and that it (the Lake Shore) is justified in meeting the rates of the Wabash on the ground of "outside competition." The Grand Trunk claims the right to make the differential on any rate made by the Trunk lines, and intimates that if it is not allowed to do it the company may withdraw from the Central Traffic Association. The Wabash says if the Grand Trunk has the differential, so must the Wabash.

The Central Traffic Association last week reduced the rate on wool c. l. from Chicago to New York from 65 to 50 cents; Boston, from 71 to 55; Philadelphia, from 63 to 48. It is reported that this was on demand of the Lake Shore in retaliation upon the lake and rail lines and the Chesapeake & Ohio. On Monday, the 16th, a further reduction was announced by the Lackawanna to 40 cents, which was promptly met by the other lines. The Lehigh Valley also reduced the 5th class rate half a cent, to 17 cents.

Taking effect June 25 the Western Freight Association announces a rate on cattle from southwest Missouri River points on shipments from points in Iowa and Missouri of 18 cents to Chicago, with the usual differentials at Mississippi River points; all lines to be at liberty to accept from Kansas City, St. Joseph, Atchison and Leavenworth 12½ cents per 100 lbs. on carload shipments to Chicago as a proportion of a through rate applying on shipments from points beyond, subject to a minimum through rate of 18 cents.

Chairman Midgley, of the Southwestern division of the Western Freight Association, has issued a letter to the members in which he summarizes a portion of the tonnage for the first five months of 1890 and compares it with the corresponding period of 1889. The statement shows the following increase over 1889 in car loads: Wheat, 3,340; other grain, 39,687; P. H. products, 469; fresh meat, 631; cattle, 6,375; hogs and sheep, 201; total, 50,703. He then goes on to show that notwithstanding the large increase in tonnage there has been a total loss of revenue of approximately $776,650, owing to the rate wars, not including lumber, on which there has also been a large loss. He reminds the managers that the war does not benefit the consumer, while the railroads sacrifice needlessly a large portion of their revenue, and urges them to agree upon some plan of dividing the tonnage, and thus put an end to the present demoralized condition of affairs.

At a meeting of the Freight Committee of the Central Traffic Association held June 12, it was decided that the uniform bill of lading should go into effect not later than Aug. 1.

President Cable, of the Rock Island, is reported as saying that the wheat prospects in the Northwest are exceptionally good.

Chairman Walker, of the Interstate Commerce Railway Association, has written a letter to the Interstate Commerce Commission protesting against the reduction of three cents in the wheat rate and two cents in the corn rate from Western states, as recently recommended by the commission. He declares that the testimony secured by the commission all showed there should be no further reduction in rates, and that the railroads were not given a proper hearing. Should the reduction be made, as proposed, in Iowa, Nebraska, Kansas, Missouri, North and South Dakota and Minnesota, Chairman Walker says the commission "will have rendered the largest money judgment ever attempted to be pronounced by a human tribunal."

The Interstate Commerce Commission.

The Commission has announced its decision of the case of the Manufacturers and Jobbers' Union of Mankato, Minn., against the Minneapolis & St. Louis and other roads, in favor of the complainant. The opinion was written by Commissioner Schoonmaker. The Mankato dealers complained that rates from Chicago to Mankato should be no higher than to Waterville, Minneapolis, and other points. The points decided are that charges should be relatively reasonable as well as reasonable in themselves, and a locality not widely dissimilar in situation to other localities where lower rates are given is entitled to rates that bear a just relation to the lower charges made. When a carrier charges low rates from some localities by reason of competitive conditions or for purposes of its own, it accepts the legal obligation to give impartial service to other patrons at other localities that sustain similar relations to the traffic. The Commission rules that a somewhat higher charge to Mankato than to the places above named is not unlawful, but that a difference of 20 per cent. is excessive and that a difference of 10 per cent. on the several classes should not be exceeded.

Chairman Goddard, of the Western Passenger Association, on Tuesday authorized the roads leading westward from Chicago to make a rate of $23 to Denver and return on the occasion of the annual meeting of the Travelers' Protective Association. This is done to meet the action of the St. Louis lines in making an $18 round-trip rate between St. Louis and Denver. It is understood that this cut was really made before the organization of the Western Passenger Association was completed, and it will not be allowed to cause any serious disturbance. The authorized rate for this meeting was one fare for the round trip, which would be $25.65 from St. Louis and $30.65 from Chicago.

The Atchison has been found guilty of furnishing free sleeping-car accommodation in order to even up on the rate, and has been fined $100 by Chairman Goddard.

The case of the Michigan Central Railroad Co. and Alexander Mackay, Frederick C. Nicholas, Matson P. Griswold, Arthur W. Street and E. L. Somers, agents and employés, under the indictment found by the Federal grand jury for violation of the Interstate Commerce law nearly a year ago, was called in the United States Circuit Court here on Monday. The indicted officials were not present and District Attorney Ewing applied for a writ of distringas to bring them into court in order to ascertain who is responsible for the infringement of the law. The counsel for the road appeared and raised the point that whatever violation of the law there might be, the rail road company knew nothing about it and could not be punished criminally. While it was admitted that in a civil case a railroad might perhaps be liable for the acts of its servants, the principle did not extend to a criminal case. The District Attorney claimed the right to interrogate the officers of the road under oath and cross-examine them as to their knowledge of the violation of the law, hence argued for the issuance of the writ. Judge Blodgett decided that the road is not a party to suit and granted the application of the District Attorney for a writ of distringas to bring the indicted officials into court for trial.

Heavy Stock Shipments.

The Gulf, Colorado & Santa Fe and the Denver, Texas & Ft. Worth have lately been overrun with cattle shipments, the shortage of cars some of the time being as great as 1,000. The Santa Fe borrowed 10 engines from the Kansas City, Wyandotte & Northwestern. Up to last week that road had hauled nearly 200,000 head out of Texas, Arizona and New Mexico, all of which were shipped to Montana. The Fort Worth road has carried nearly as many. The roads did not anticipate such heavy business, as many of the cattlemen had expected to drive their herds. Not one-tenth as much stock was driven over the trail this year as last, and leading cattle-growers predict that the last of the big herds have been seen on the trail.

Overland Traffic.

A statement of the East and West bound overland passenger business of the Southern Pacific for the first four months of this year as compared with the same period last year shows that the decrease in the number of East-bound passengers was 7,507; decrease in West-bound business, 11,025 passengers.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, June 14, amounted to 57,308 tons, against 64,638 tons during the preceding week, a decrease of 7,330 tons, and against 39,156 tons during the corresponding week of 1889, an increase of 18,152 tons. The proportions carried by each road were:

	W'k to June 14.		W'k to June 7.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	6,729	11.7	4,839	9.4
Wabash	3,154	5.5	3,555	9.9
Lake Shore & Michigan South.	10,397	18.1	9,154	17.8
Pitts., Ft. Wayne & Chicago	7,506	13.1	6,052	11.8
Chicago, St. Louis & Pitts.	7,145	12.5	6,888	13.4
Baltimore & Ohio	3,315	5.8	4,408	8.6
Chicago & Grand Trunk	7,441	13 0	5,723	1· 2
New York, Chic. & St. Louis	5,437	9.5	4,601	9.0
Chicago & Atlantic	6,184	10.8	6,130	11.9
Total	57,308	100 0	51,350	100.0

Of the above shipments 984 tons were flour, 26,923 tons grain, 1,369 tons millstuffs, 5,325 tons cured meats, 1,515 tons lard, 8,962 tons dressed beef, 5,345 tons butter, 1,245 tons hides, 276 tons wool and 6,292 tons lumber. The three Vanderbilt lines carried 39.3 per cent. of all the business, while the two Pennsylvania lines carried but 25.6 per cent.